

Briefing

ISA mission to Mexico

A HIGH-POWERED delegation coordinated by the International Marketing Sub-Committee of the Computing Services Association will visit Mexico later this month on the invitation of the Mexican Government.

The ISA mission, which will include representatives from the Department of Industry, the National Computing Centre and ICL, will make presentations over three days to some 150 representatives of Mexican government departments and public sector bodies.

"This is the first breakthrough of the ISA International Marketing Sub-Committee," chairman Donald Moore told Computer Weekly. "We will be emphasising the whole range of skills and experience of the UK services industry."

Ferranti sale

THE stake that the NEB holds in Ferranti is being put on the market. The sale of shares for about £10 million gives the government a profit on the investment in Ferranti, one of the UK's most successful high technology firms and is intended to make its exit introduction to the stock exchange easier. The shares are being sold under simplified conditions of the deal which gave Ferranti government aid in 1975 (CW, May 22, 1978).

Orbit launch

ORBIT, the IBM mini-based distributed processing alternative to its 3700 communications processor (CW, August 31), is expected to be announced by IBM next week, according to US sources.

More memory

A MAIN memory that can be expanded to one Megabyte and a 2000 nanosecond cycle time is two of the main features of the Eclipse S/250 scientific minicomputer introduced by Data General. Opinions available with the S/250 include a floating point processor, an integral array processor and a burst multiplexer channel offering I/O rates of up to 10 megabytes per second.

COM move

THE computer output microfilm service side of the Lowndes Ajax Bureau has been moved from Victoria in Central London to the company's new headquarters at Milton House, Croydon, Surrey. At the same time the COM service has installed a second Datagraphix 4565 COM reader.

Vimpey's minis

TOTAL of 16 Data General minicomputers with a transaction processing software package developed in the US by the Data Communications Corp of Memphis, Tennessee, are being applied by the US firm's European division, DCC International, to its first UK customer, Vimpey and Co, under a £10,000 contract.

'We don't want to be latter-day Luddites' — TUC

IT is imperative that trade unions strike a responsible balance and do not become "latter-day Luddites" in dealing with the human and social problems raised by the introduction of microelectronics.

This was one of the points raised by Bryan Stanley, general secretary of the Post Office Engineering Union, on the opening day of the TUC conference in Brighton, when he moved an eight-point motion relating to employment problems created by technology.

The motion was carried unanimously and the TUC was asked to develop detailed proposals on the subject in time for next year's congress.

"As trade unions we have to strike a responsible balance," said Stanley. "On

the one hand we don't want to be latter-day Luddites, blindly opposing all changes in technology and insisting on the maintenance of existing equipment and skills however inefficient, however irrelevant they become. That approach would not only be impractical, it would be counter-productive."

The path to success, felt Stanley, did not lie with the scientists, the economists or the managers; these groups were too bound up with the technical details of the situation, he said.

"Only the trade union can insist upon human values coming first, and that the use of new technology must take account of the human and social implications. Technology must serve mankind, not

mankind serve technology."

In his opening address, the TUC chairman David Basnett also pinpointed the impact of microelectronics as one of the main concerns of the unions. He said the combination of new technology and a world recession could hold out the prospect of jobs being killed faster than they were created, but he also pointed out that technology could bring "opportunities as well as difficulties."

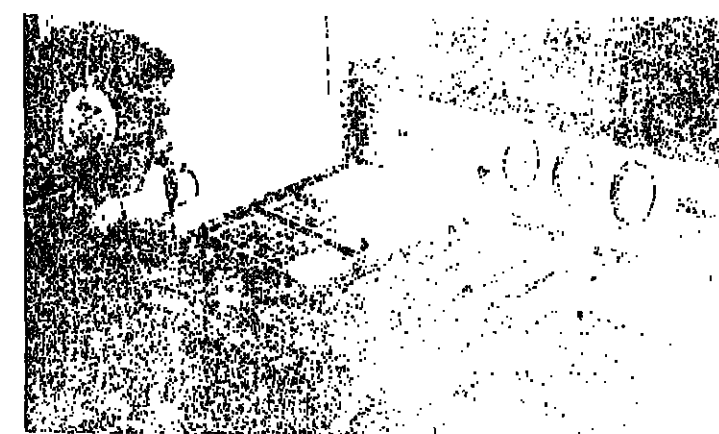
The resolution called on the government to develop forward plans to expand job opportunities in affected areas and to develop a comprehensive study of the social consequences of the technology.

Specialist training was needed, the resolution said, to support the

implementation of "urgent steps" to develop Britain's microelectronics capability and it also said there should be a growth in training and education "to allow the transfer to a high technology society to proceed smoothly."

A public commitment by government to a shorter working week and a study of the opportunities offered by increased leisure was ruled for. International co-operation with other unions and governments was also emphasised.

Speaking in Australia, before the TUC discussions began (see page 9) Lord Avebury criticised trade unions for failing to give a more effective lead in developing plans for a more leisure-oriented society.



Introductions at Farnborough International 78 include a new microprocessor-controlled voice-switching system from International Aeradio, shown here.
Farnborough review — see back page.

IBM and ICL in office challenge

BOTH IBM and ICL have made important moves in the burgeoning automated office market. As a first step towards a full-scale attack on word processing, ICL is negotiating a large order for a range of daisy wheel printers while IBM has introduced a Text Routing System developed in the UK for the Series 1 which enhances the company's electronic mail and word processing capability.

As exclusively reported (CW, March 23), word processing software has been developed by ICL for both the 7502 series of terminal systems and for the 1500 terminal inherited from Singer.

The company has not yet completed its plans for entering the word processing market, and has not decided which of the two products will get the major thrust. The software is already under test at some customer sites.

The signs are that the 7502 series will be emphasised, at least in the UK. There is a wide range of models and configurations of the terminal system, which is configured around a minicomputer specially developed for it within ICL. But it is understood that the word pro-

cessing on the 1500 is being considered as a major market area in the US.

The text routing system from IBM interfaces a Series 1 mini with the Office System 6 to provide a strong electronic mail and shared logic word processing capability.

This facility is an important element in the "automated office" which is currently being attacked by a number of large multinationals, including Xerox, AT&T, Wang and Toshiba (CW, August 24).

● Turn to page 8

Third World is eager for computer power, say conference delegates

THE British delegation to the Split Inter-Governmental Conference on Strategies and Policies for Informatics is returning from the 10-day conference in Yugoslavia impressed with the importance attached to computing by developing countries.

"We have found a great awareness among the delegates that informatics must be a key element in their development strategies," Peter Hall, director

of corporate communications at ICL and a member of the delegation, told Computer Weekly.

"However, the developed countries believe that a pragmatic approach is best, while the developing countries seem to favour grand strategies and national plans."

He cited the UK offer of training assistance as an example of the pragmatic approach (CW, August 31).

Software bundling complaint by users

IBM Computer Users' Association has complained to the company about the marketing of Advanced Communications Function software, an important component of the firm's plans for networking, including Systems Network Architecture.

One aspect of the CUA's objection is the handling of ACF

and VTAM with CICS, which users feel is an attempt to force them into adopting SNA.

In the US, IBM is reported to have made special efforts to help early users of VCF/VTAM. In addition to bugs in the initial software release, problems including timing discrepancies were encountered in the inter-

face to other major systems software.

However, "none of the users contacted reported extreme dissatisfaction with the ACF/VTAM access method or with complementary software products such as ACF/NCP", according to the US publication Electronic News.

COMPUTER WORLD KEY TOPICS IN THE NEWS

HUMAN CHESS WIN
This week, International chess master David Levy won his £1,250 bet that he would not lose a match to a computer chess program in the ten years from August 1988. But Levy did not have it all his own way. Computer Weekly carries a match report and a Chesslab by one of the losers of the bet, Professor Donald Michie. Pages 3 and 11

PROFESSIONAL PRIDE
It is sometimes easier to pass a camel through the eye of a needle than to define what is really meant by a "computer professional." But BCS president Professor Paul Samet explains why he believes a valid definition can and should be made to pin down the elusive computer professional. Page 12

WHAT'S IN STORE
Although the spotlight is usually turned on the mainframe processor, the storage media are an equally important part of an installation. In this week's magazine storage media supplement we look at how improvements in storage efficiency can be made, and at developments in the well known floppy disc devices, as well as in the new field of optical memories. Pages 17 and 19

SALES BITE
Our popular Sales Bit column takes an inclusive dig at the "routine call" gambit. Page 53

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Focus on DPMs

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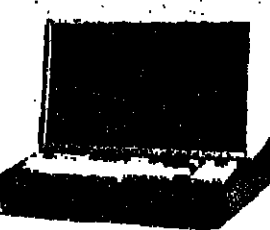
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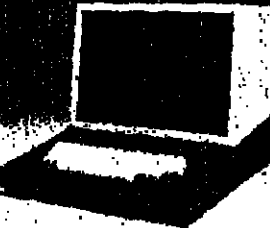
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Right to information: The fight goes on

By Tom Riley

THE publication earlier this year of a White Paper on the reform of Section 2 of the 1911 Official Secrets Act made it clear to those advocating laws on access to information that the government has no intention of bringing in legislation in the foreseeable future (CW, July 10).

The White Paper stated that the US and Swedish experiences needed more study before any implementation was made. It went on to say that "before deciding whether to go further, we shall initiate a more detailed study than has so far been possible of overseas experience and its relevance to our own constitutional system, in order to see what further action, whether by means of legislation or by non-statutory methods, may be desirable, and we shall announce our conclusions from this study in due course."

This caused a furious reaction from those who have been fighting for legislation. The general consensus is that the government is stalling yet again in order to keep tightly clamped down the lid of secrecy that prevents Whitehall from being responsible to the public for its actions. The Prime Minister and his senior ministers have chosen to ignore their own grass-roots elements, those members of the Party that passed a resolution last year urging the initiation of a Freedom of Information law.

In addition to this, the Labour Party has proposed an FoI law and is currently drafting proposals.

Robin Cook, Labour MP for Edinburgh Central, introduced a private member's Bill, the Official Information Bill, in protest at the White Paper. The Bill made substantial recommendations, including one which said that a department would only have 20 working

days to respond to an information request.

The public pressure campaign has been outspoken in its reaction to the White Paper. At an open meeting in the House of Commons after the release of the White Paper, Arthur Lewis, Labour MP for Newnham Northwest, and chairman of the all-party Parliamentary Committee for Freedom of Information and Privacy, told the large crowd that every person present

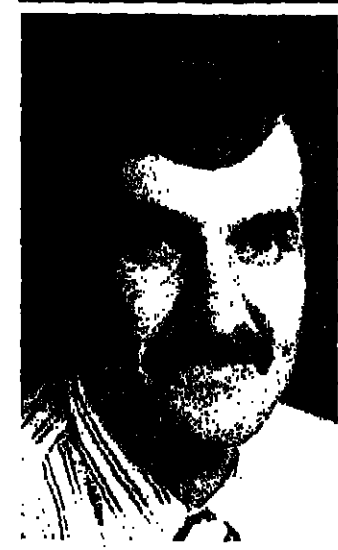
pounds on questionable projects and activities.

He felt that the cost would be of minimal importance compared to the long-range benefit to the country. A government that was accountable to its people, and knew that the money it was spending could be overseen by the public eye, would go a long way to distribute the tax dollar a lot more wisely than was currently being done.

The rapid development of the powerful new forces of information technology has highlighted the growing value of information as a key factor in business, social and personal life.

Aspects of the information question include the free access to public information and the protection of an individual's private data — the issues of freedom of information and privacy. Freelance journalist TOM RILEY has recently come to the UK from Canada, where he has been a committed supporter of the freedom of information campaigns throughout the world.

Here Riley explains why UK campaigners are optimistic despite recent setbacks.



should canvas all the candidates in the next election to make freedom of information a major issue and to get every candidate's views known and published in the local press.

Leslie Chapman, author of the recently published book, *Your Disobedient Servant*, attacked the government for contending that the costs of the legislation might be prohibitive. He told the meeting that in his years as a Civil Servant he had witnessed the wasting of millions of

Kenneth Warren, Conservative MP for Hastings, and chairman of the Freedom of Information Campaign, the public arm of the All-Party Committee, said that enough study had been done on the US and Swedish systems, and that the time had come for action.

Neither body, though disappointed by the government's procrastinating actions, is discouraged by recent developments. Lewis said that his campaign would continue to apply

pressure. He pointed out that there were already over 200 Parliamentarians who supported this concept of access to government reports and documents.

The response to the committee's work has been excellent, and a lot of progress has been made since Lewis set up the All-Party Committee in April, 1975. The Freedom of Information Campaign sprang out of the All-Party Committee, as the former had been organised to develop support in the House of Commons and the House of Lords, but support from the public was so widespread that it necessitated the setting up of a second committee to organise the campaign properly and take advantage of the growing support.

The effects of the work of the two bodies have certainly been felt, as the whole of government secrecy — the right of the public to be truly informed of what its government is doing and why, and the right of an individual to know what is on his/her own personal file — has become a major issue in the media and with many other groups and individuals.

The TUC and the TUC-Labour Party Liaison Committee have passed resolutions calling for laws on freedom of information and privacy and have been joined by many others.

The government can only ignore the will of the people for so long before the electorate tires of it and throws it out at the polls. Proposition 13 in California in which the people voted for lowered property taxes and caused giant spending cutbacks, is one such example.

Things are definitely different in the UK and the government does move in a different way, but the ballot box is still there. It

could be that freedom of information is an issue which could bring about such a radical step as defeat at the polls, as more and more people become aware of the issue.

We are now moving rapidly into an Information Age. Consultant Adrian Norman, pointing this out in a speech at the open meeting in the House of Commons, said that he was of the opinion that "by the time we have an effective Freedom of Information Act we shall be an information society and an information economy."

It is recognised that information is power, and that he who controls the information controls the state — a precept known to any dictator.

Information is a major industry today. Its importance to the economy is reflected in the interest shown by people in the computer field who, aware of the great dangers implicit in the storage, retrieval, dissemination and other uses of information, take a keen interest in freedom of information.

The report of the Data Protection Committee's study is, therefore, anxiously awaited, as it will deal with the other side of the coin of FoI, one of equal importance: the protection of the individual, who today has vast amounts of data about him or her being stored and circulated.

It is expected that the report will recommend that individuals have access to their personal medical, credit-rating and similar files.

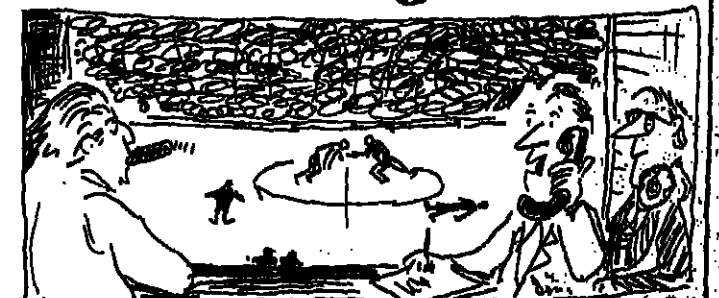
Whatever the outcome of any future studies or promises by the government (whether it be Labour or Conservative) it is certain that FoI advocates will continue their campaign with fervour and dedication.

Spurred to action, VLI wins Chelsea derby

THE directors of the VLI computer services group are justifiably "over the moon" because they are to sponsor one of the top football games this season at Chelsea's Stamford Bridge ground, the London derby on November 18 with Spurs — the team spiced this season with a Latin American flavour.

There was hot competition with other potential sponsors for this game, but VLI won. And in return for a sponsorship sum adjacent to four digits, VLI will get its name on the programme, advertising space in front of the TV cameras (if there are any) and the opportunity to stage some special event.

"We have thought of ideas like issuing balloons for the spectators, but have not decided on anything definite yet," VLI marketing director Anthony Lambie told me. Sponsorship for this game does have a touch of irony for Bayfield, who admits that Tottenham was his "first love" amongst London League clubs. Chelsea a few years ago by the hard-running young team developed by Eddie McCreadie. But Bayfield is now firmly a



"Another recruitment contract, sir — from a Mr Brian Clough"

Chelsea fan and will be definitely on the side of the Blues. The Chelsea/Spurs game is only the tip of the blue iceberg as far as VLI's involvement with Chelsea this season is concerned. For the group, which includes the Computer People and Co-Operators recruitment and contract staff consultants and the SIL systems house, has also obtained possession of the most prestigious box in Chelsea's new East Stand. The group will also have the main advertising space on Chelsea's new electronic scoreboard (CW, July 27) and its name appears in the club programme as a "founding patron."

Despite Bayfield's support for Chelsea, the decision to become involved with the club was taken for hard-headed commercial reasons, according to Lambie, who is not personally interested in football. After meeting Chelsea's promotions manager, ex-striker Ian Hutchinson, the club facilities, which include a restaurant as well as the luxury boxes, that he felt was a useful way to spend some of the group's cash. "The box allows us to reach regional clients in a strong regional roots in the North and Midlands (see page 11), the away teams playing at Stamford Bridge offer opportunities for entertainment with a strong local interest."

'Personal' impact on the DP manager

JUST how much is the personal computer relevant to the DP manager? This question is likely to be asked more and more as the market for such equipment expands.

To provide a forum at which an answer may be found, Computer Weekly is collaborating with the Institute of Data Processing Management in an evening meeting next month that will give an airing to the impact and trends of micro systems on data processing and DP management.

Taking part in the discussions will be a mainframe computer supplier, Dr Adrian Stokes of Langton Systems, and Computer Weekly editor Malcolm Peltu, among others. It is also planned to have a display of personal computers on which interested parties can debate. Data for the forum is October 18, and the venue is the Imperial Hotel, Russell Square, London WC1. Starting time is 8pm. Non-members of the IDPM are welcome.

AMD allies with Zilog to enter 16-bit micro market

AS an ally in its entry to the advanced 16-bit microprocessor market, Zilog has pulled in Advanced Micro Devices. The Z8000 will be launched at the end of this year.

The two companies have signed a technical exchange and cross-licensing agreement specifically for the device and its peripheral and support circuits. It does not give Zilog rights to AMD's 2900 family 4-bit slice devices.

Under the terms of the agreement, AMD will become a second source for the processor, and will soon be receiving mask sets from Zilog, together with test and other relevant data.

In addition, the two will be jointly developing and mutually cross-licensing the peripheral and support circuits which the Z8000 will need.

Specific details of this part of

the deal have yet to be worked out, although Zilog has already started development work on some of the required parts, such as a memory management chip which is due for introduction early next year.

Each company will be responsible for the development of specific products, which will then be cross-licensed to the other company.

AMD has decided to go in with Zilog because, in the words of president Jerry Sanders, the Z8000 offers "the highest performance/cost ratio for the next generation CPU."

Both Sanders and Zilog president Federico Faggin express the view that the agreement will benefit future customers by developing a full range of peripheral circuits rapidly.

The Z8000 is claimed by the company to be the fastest 16-bit

Storage Technology issues disc drive challenge to IBM

A DISC drive with twice the capacity of the IBM 3350 and a charge coupled device memory offered as a direct alternative to the IBM 2305 fixed head disc drive are two products for IBM users being lined up by Storage Technology Corp.

STC's president, Jesse Awelwa, says the high capacity disc drive will be launched next June, and will have double the track density of the existing STC 8350, which is STC's direct alternative to the 317.5 Megabyte IBM 3350.

The charge coupled device memory is called FAM, Fast Access Memory, and will start to be shipped early next year. FAM has a capacity of 44 Megabytes and will be able to replace directly up to four 11 Megabyte IBM 2305 fixed disc drives while offering a much faster access time — less than one millisecond — and costing a lot less, although the prices have yet to be announced.

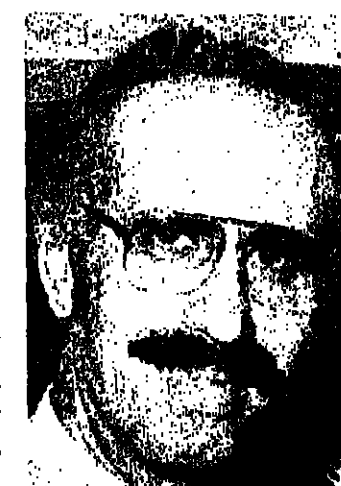
The FAM is totally compatible with IBM operating software and "looks" exactly like a 2305 to the system. Awelwa pointed out that substantial orders have already been placed for FAM in the US, even though it is not formally launched yet.

By early 1980 STC will start shipping an intelligent disc subsystem called VSS which will use a CCD buffer and a controller to "stage" data from disc into main memory. Awelwa sees VSS as a smaller but much faster version of the IBM 3850 mass storage system and feels sure that there is a much bigger market for VSS than for the 3850. It will cost a lot less than the 3850.

Awelwa left IBM in the late 1960s to found STC, and has built the company into the biggest supplier of tape drives in the world. He claims that STC now ships a higher volume of tape drives than IBM — a claim that IBM finds useful ammunition in its anti-trust duel with the US government.

STC now aims to achieve the same dominant position in the market for disc drives, according to Awelwa, and at the same time it hopes to increase the proportion of its business outside the US from the unusually low present level of 10% to 35%.

STC established a subsidiary in the UK earlier this year which is called Storage Technology Ltd, STL, to avoid confusion with the telecommunications manufacturer, STC.



AWELWA... "substantial orders"

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Course for recent graduates

TO combat the effects of the current shortage of suitably trained programming staff, the Edinburgh-based consultancy, Systems Consultants Ltd, has inaugurated a special course for newly-qualified graduates or the equivalent, covering all aspects of commercial computing and concentrating on the role in the market place of a commercial computer consultancy.

Commented SCL director George Kerr: "We are facing an increasing shortage of commercially trained staff who can combine practical computing experience with a first-class academic education. The course is solely for our own recruits, but we feel that the computer service industry has a duty to carry out training programmes for new entrants to the profession."

Calcomp offers 300M byte drive for Series 1

EXISTING or potential users of IBM Series 1 minicomputers are now offered a range of disc subsystems by Calcomp that can have drives with capacities of up to 300 Megabytes each. This compares with the maximum of 64 Megabytes per drive currently offered by IBM.

The drives are Calcomp's existing removable pack Trident units that come in capacities ranging from 25 to 300 Megabytes. Calcomp has developed a controller and a software device driver to help the Trident

drives to interface with the Series 1 CPU. But the customer will still have to write software to enable the device driver to work with his operating system.

A range of disc subsystems with capacities per drive going up to 240 Megabytes will be launched in the UK at the end of the year by Control Data as part of the Certainty series of peripherals for Series 1 (CW, June 22). Control Data is understood to have a 64 Megabyte fixed disc drive on the stocks to compete directly with IBM.

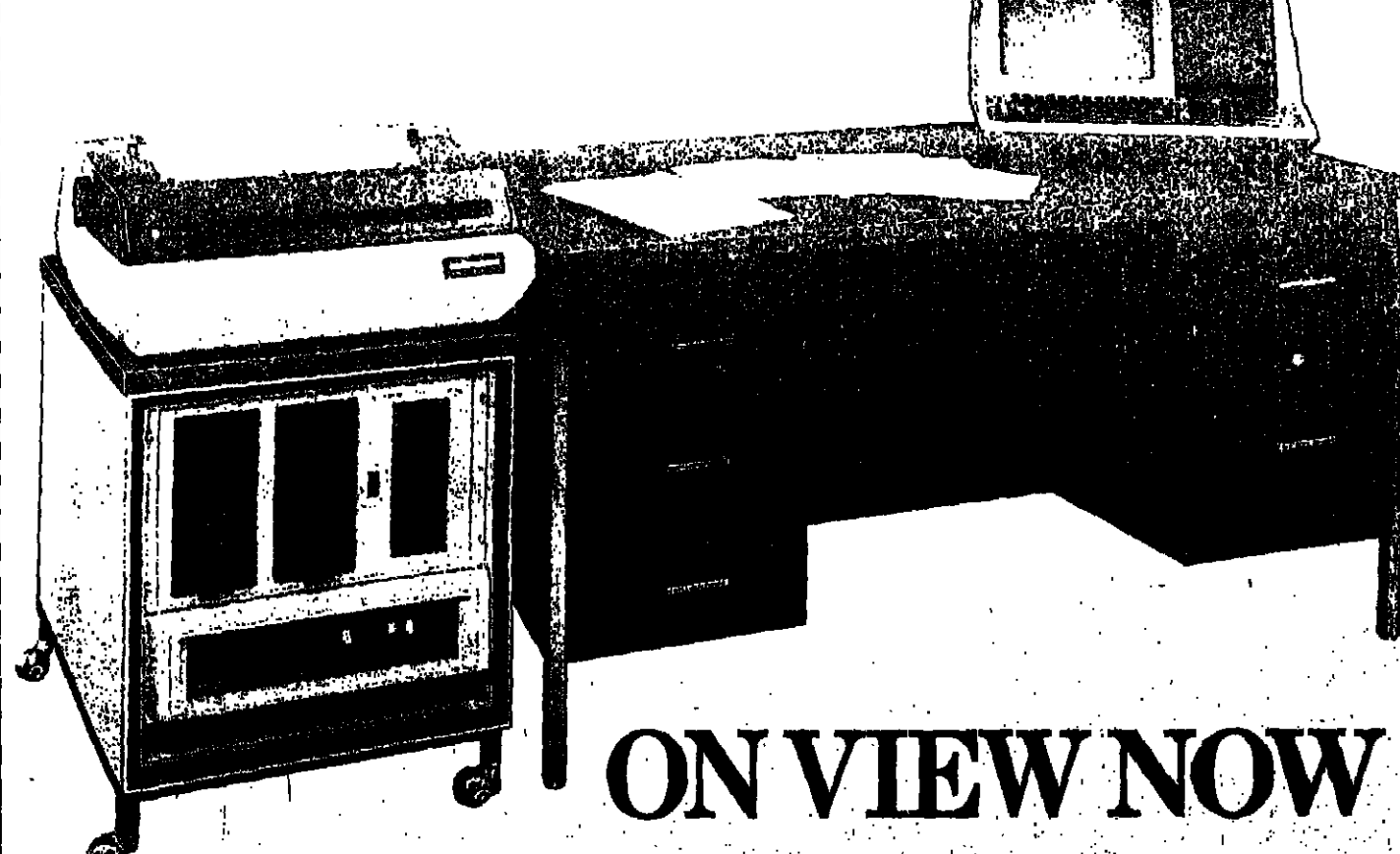
Wartime aerodrome to be site of ICL installation

THE site of the old Sergeant's Mess at the World War II West Malling Aerodrome is to be the home of one of the first implementations of ICL's new 2980-297X Common Storage Facility. The customer is Kent County Council, which is currently equipped with two ICL 1904S machines, and the £2 million order includes one of the new enhanced 2976 systems and a 2980.

The Common Storage Facility

enables users to switch stored access and store multiple access controllers, main memory and disc units between a 2980 order code processor and a new 2972 or 2976 order code processor (CW, July 13). This means that users with a large unconverted ICL 1900 workload can estimate their final configuration requirement for the 297X machine, buy a 2980 order code processor, and switch the memory and disc.

PM-DSYST-1



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The Plessey Peripheral System PM-DSYST-1 is a family of enhanced DEC 320 compatible, general purpose, time shared, disc based computer systems specially designed for business applications. It uses Plessey commercial systems-001 disc resident operating system and can run all languages applicable to RT-11.

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Equipment for system expansion includes additional cartridge disc storage up to 20 Megabytes • dual floppy disc units with 512 K bytes • 45 cps Daisy Wheel printer or a 300 LPM printer • various additional video terminals or hard copy terminals.

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GILB'S MYTHODOLOGY

Standards less important than standard of documentation



REMEMBER the chaotic Sixties? Beatles and undocumented programming. Many readers had not been born into the DP ranks then, but the history of the panic reactions to the situation can be traced. It can be in the current program documentation standards.

Admittedly some standardised order is preferable to low quality incomprehensible, un-commented assembler language programs. My point is that documentation should not be a goal in itself.

The real goal should be recognised clearly at the initiation of the work, and if the customary documentation technique is more costly or less effective than the project requirements state, then the project team should be allowed, or even be required, to dump the standard in favour of some technology which meets project goals.

The one great advantage of forcing programmers and analysts to produce mountains of conventional written "maintenance" documentation is that nobody has to exercise professional ability in order to find a better alternative.

Tradition, the Fiddler on the Roof shouted in his song, and for some, mediocre results by tradition are preferable to excellent results by the exercise of some professional knowledge.

There are so many effective alternatives to the traditional program documentation available today, that I believe that there is some set of them which will always meet project goals better than any of the conventional

tional program documentation methods.

I have touched upon some of the alternative technologies in earlier columns, and there are many more flooding our professional literature. The key to recognising the alternative or supplementary technologies is to think in terms of the maintainability cost ratio. How much maintenance ability and what what costs for development and during actual maintenance?

Any alternative technology is then compared to your conventional documentation in terms of how much it helps maintenance programmers understand programs, make changes and confirm the correct workings of those changes — without unseen side effects.

Cost, clock time, human effort and resulting reliability are factors to be evaluated here.

The conventional objection, that if we don't have a standard, then different people will not be able to understand the documentation, is not relevant.

One reason is that many of the replacements for conventional documentation are automatic aids for tracing errors or program workings, and they are not dependent on people who have learned a standard.

Another reason is that most of the alternatives are immediately obvious to any professional, and either more effective in maintenance work or a lot cheaper to implement. If they are better in these ways

then the fact they are different from convention is not relevant.

It is just an attempt to avoid necessary change by management which is not doing its job of serious evaluation of potentially better techniques.

One of the most important trends in program documentation has been the effort to make the programs themselves far more readable. High level languages, modularisation, structuring, indentation and comments all contribute. The old crutch is no longer necessary, but it persists due to organisational momentum.

Other trends are in automated evaluation techniques such as distinct software, where the documentation is expressed in an executable program for direct comparison; and in extensive file analysis or database diagnosis programs, which identify errors or side-effects from maintenance change.

An extensive list of automated aids was published in the IEEE "Computer" July, 1977, and many of the more recent ones are discussed at length in my Software Metrics book.

Gilb's Hypothesis: Most of our currently common documentation techniques for program maintenance can now be replaced by more effective technology. The reason is mainly that the cost relationship of people and machines has changed dramatically since they were developed; more automation is needed.

SOFTWARE FILE-1

Time sharing operating system from Shade for Interdata 16-bit minis

A TIME SHARING operating system for Interdata 16-bit minicomputers has been developed by Shade (Computer Services) of Calne, Wiltshire. The software, MTX, is fully compatible with Interdata's DOS R04 operating system and can support up to 15 user terminals. Targeted particularly at existing DOS users, the system offers a convenient path to multi-user operation, notes the company, without involving either file conversion or changes in system command language. A 64K byte machine running under MTX would typically be used to support three or four concurrent users, according to Shade.

Memory requirements for the operating system are around 18K, though depend partly on the configuration. A further 245 byte control area is required in each partition.

The remaining memory is allocated by the user at switch-on, using MTX commands which define the number of partitions and their size.

In the support of multi-user activity, the system in some cases permits code sharing, by providing for re-entrant program execution. One such instance is the Basic Interpreter. The company has implemented Interdata's R03 interpreter as a pseudo extension to MTX, so that all partitions can access the same copy.

Re-entrance is also supported for some library functions and work is currently under way on adapting Interdata's Fortran run-time library to make it re-entrant.

Although compatible with DOS system command language, MTX in some areas offers extension, such as a macro facility. The system also supports

ports printer and plotter spooling, up to 16 accounting codes per user, password protection of user files, and facilities for broadcasting from the system console.

If implemented on a machine including a real-time clock, the software allocates each user a 30 ms slot. However, the system will also operate in event-driven mode where a clock is not present.

MTX is priced at £1,700, including one year's warranty. Subsequently, there is an annual maintenance charge of £200.

Future development of MTX, originally commissioned by an undisclosed customer, could include a version for the 256K Interdata 8/16E. Currently under evaluation, this software would provide six user partitions, each of 32K.

Shade, which has extensive experience of the Interdata range, was previously best known for its DOS-compatible Impos multi-tasking operating system (Software File, March 18, 1976). Over 20 of these have now been installed.

Character string handling package for Fortran IV users

A CHANCE to jump the gun on Fortran 77 in respect of character string handling, is provided by a set of functions developed by Software70 of Anaheim, California.

The package, String70, provides callable Fortran IV sub-routines for operating on variable length character strings, both individually and in tables.

Manipulations possible with the software include string comparison, string moving, and string searches, the latter allowing for multiple occurrences of the search argument in the string being searched.

Facilities are also provided for string deletion (ie substrings deletion followed by compression), string insertion (ie substrings insertion followed by concatenation) and string replacement.

File handling functions include table creation, binary search, entry insertion, and entry deletion.

String70 occupies less than 1K bytes of memory and is supplied as a sequenced source deck together with a source listing and users guide. It is priced in the US at \$70.

Elastic-plastic analysis

FOLLOWING the takeover of Electronic Calculus Ltd, University Computing Company has added to its inventory a series of ECL-developed programs for elastic-plastic structural analysis and design.

The plastic analysis system is advocated in the draft of the new Code of Practice for steel-framed buildings BS.20, and is being used increasingly in the construction industry.

The ECL system, PLSTIC, uses the direct stiffness method and performs elastic-plastic analysis on two-dimensional frames of any shape.

Misam file handler updated

A FILE maintenance system and a text editor have been added by Filetab Support Services in the latest version of its Misam DEC PDP-11 file handler.

A systems programming facility, File Maintenance System, allows the user to create or maintain both Misam-indexed data files and any data file indexed by logical record number. Written in Basic Plus, it is claimed by the company to reduce greatly systems design and programming time for file maintenance.

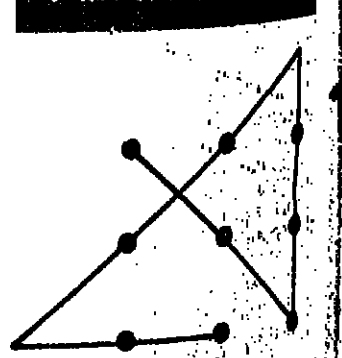
Also included in Misam Mk 2 is Ted, a text editor running under RSTS/E. Ted may be used both for editing formatted ASCII files and for amending program source files in Basic or RPL.

Misam, a multi-index, multi-key access method which runs under RSTS/E on PDP-11s, was originally developed by a Canadian systems house. The new version was partially developed in the UK by Filetab Support Services, which recently released RPL, a decision-table based language for the PDP-11 (Software File, July 27).

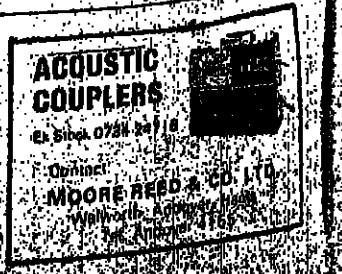
Fortran 77 standard

THE US standard for Fortran 77 was published in July and can be ordered in this country from the British Standards Institution. Orders for the document, officially titled ANSI Fortran X3.9 -- 1978, should be addressed to the Overseas Sales Dept, BSI, Pentonville Road, London N1.

Puzzler



THIS tracing problem, calling for nine dots to be joined with four consecutive strokes (with-out lifting pencil from paper), is out of lifting pencil from paper, is one of the early classics of recreational mathematics. Since then, analysis has been carried out on many larger puzzles. This week's problem is to join the 25 dots of a 5 x 5 grid with only eight consecutive strokes. See page 53 for solution.



SOFTWARE FILE -2

London venue for Euro/US conference

A JOINT European/US conference on software management is to be held in London in October. Recent US Department of Defense initiatives will be a major theme of the conference, which will also review progress in software technology and actual project experience.

Particular areas of concern will include common high order language projects, such as Ironman, under way in the US and Germany, and recent EEC moves on software portability (CIV, August 10).

Specific technical topics to be

covered include life cycle costing, software verification and validation, project auditing standards, and requirements specification languages.

There will also be presentations on software management experience in the European Space Agency and the development of Command and Control systems for Nato.

The conference, the third in an annual series, is organised by State of the Art Ltd, Victoria House, Suite 501, Southampton Row, London WC1. 01-242 4045.

SIR goes into SIA

A DATABASE management system which interfaces directly with the widely-used SPSS program for statistical analysis has been installed by the London bureau, SIA. The system, SIR (Scientific Information Retrieval), provides users with an integrated tool for data organisation, storage, and analysis.

SIR, which also interfaces with the BDMP suite, supports hierarchical data structures. A simple command language provides facilities for hierarchy manipulation, report generation, and file security control.

The system, which operates in either batch or interactive mode, also allows the user to extract subsets of the database and store them in SPSS SAVE files. This provides an economical way of analysing data subsets, without having to write a special extraction program.

Bradford graphics package offered free to other universities

A GRAPHICS package developed at the University of Bradford is to be offered free to other universities under a sharing agreement, and has already been installed by the University of Manchester Regional Computer Centre.

Called Simpleplot, the software provides facilities for plotting two-dimensional and three-dimensional graphs and is particularly intended for use by engineers and scientists.

The package, written in Fortran, will also be made available to industrial and commercial users. Initially through the Bradford University Industrial Liaison Office.

Simpleplot has been in use at Bradford University for nearly five years and has been implemented on ICL 2900, CDC 7600, and DEC PDP-10 systems. A version for IBM 360/370 equipment is under development.

The software consists of a set of subroutines for each component of the plotting process, from drawing and labelling axes and keys to drawing either smooth or broken curves through a set of points.

A feature of the package is the close relationship between these instructions and the steps involved in producing graphs manually. The software is thus claimed to be more accessible to non-specialist users.

At the same time, it can produce a wide range of high-quality graphs. In addition to plotting histograms, contour graphs, and hidden-line surface drawings, it can handle linear, logarithmic, or polar axes and Smith charts.

MoD orders Mascot kernel for use on F100-L

THE Ministry of Defence has commissioned the development of a Mascot kernel for use on the Ferranti F100-L microprocessor. The contract, placed with Y-Ard of Glasgow, calls for delivery of an initial version of the software by the end of the year.

At the same time, the expected first application for the software neatly demonstrates the Ministry's aim of achieving application system portability through the use of Mascot, which is understood to be under consideration as a standard for real time defence computing (CW, August 10).

To be written in Coral 86, the real time executive will provide for the scheduling of concurrent application tasks or, in Mascot terminology, activities.

It will also provide facilities for peripheral interfacing notably a serial line handler and a DMA handler, and an interface to a real time clock.

The kernel is intended particularly for memory resident applications, where no backing store is available. The typical

application environment envisaged is that of a distributed control system, in which each processor will hold a minimum, stripped-down, software configuration.

However, the kernel will also be configurable in development versions, for running either on a standard F100-L development system, or on a hosted software development system.

The facilities provided, for example for error reporting and

monitoring, will thus have varying complexity, depending on the configuration of the system to user requirements.

Y-Ard has already developed, and supplied to the MoD, a Mascot kernel for the Intel 8080 microprocessor. The new executive will use the processor-independent portions of an existing kernel, according to a spokesman for the company, and its development will involve writing supplementary software

special to the F100-L.

The first application, he said, was likely to be in a distributed control system for ship power plants. This was currently based on 8080s, but the MoD was keen to replace some of these with Ferranti processors.

The size of the executive could not yet be determined in detail but would depend very much on the efficiency of Ferranti's Coral compiler for the F100-L, the spokesman noted.

PROGRAMMER NOTES

Have Cobol, will travel

As he pointed out, there are failures on both sides in developing computing as a long-term career.

Programmers tend to be more loyal to their subject specialisation than to their career within a particular company or user industry.

Others in the industry would go further than Benjamin in suggesting that too many young programmers, having landed in a scene with an overwhelming number of vacancies, good money and a generally easy life, have found it all too easy to drift from one job to another without ever really taking responsibility for seeing projects through.

The scarcity of skilled people, burgeoning new projects and computer applications, and a certain abdication by management

from tackling the tricky problem of managing the highly articulate and often temperamental programming community, have helped to build up a wide market for contract staff.

Although the nature of many computer implementations with peaks and troughs, would inevitably create such a requirement, it is all too easy for young people to drift into contract work for a number of years of easy, no-responsibility living.

This still does not answer the question of where the programmers go when they grow older. Having Cobol PL/I or Fortran is still sufficient armoury to enable a programmer to survive and prosper doing his or her "own thing", and there are sufficient job vacancies to enable any programmer wishing to settle to find a cosy niche.

But is there sufficient commitment from programmers to their career/profession which has given them such a good start in working life?

COMPUTER WEEKLY/IDPM WORKSHOP

Computer Weekly in association with the Institute of Data Processing Management present

Successful User Relations

A PRACTICAL WORKSHOP ON EFFECTIVE COMMUNICATION BETWEEN THE DATA PROCESSING DEPARTMENT AND THE USERS

Tuesday, October 17, 1978, at the Holiday Inn, London

Because DP is a service function, it depends on its users for ultimate success. But users from the Board to the shop floor differ in needs and outlooks and as they grow in power and numbers their attitudes can make or break the fortunes of DP.

This practical workshop, to be run by Nigel Laurie of Communications Audit, will help delegates to discover the techniques and approaches that work best in helping to manage successful user relations. The workshop is practical and based on experience. Above all it is participative so that delegates can put the theory into practice. A summary of a survey conducted on this subject was published in Computer Weekly on May 25.

For this latest workshop the number of participants will be limited in order that the maximum benefit may be achieved. If you would like to reserve a place please complete the application form and return it to the address shown, not to Computer Weekly on the IDPM. A brochure giving further information about the workshop may be had from Tony Swain, B17 40 Bowling Green Lane, London EC1 1NY. Tel: 01-257 3846.

To: Conference Administrator, IPC Business and Industrial Training, Surrey House, Throlyway Way, Sutton, Surrey SM1 4QQ. Telephone: 01-843 8040

Please reserve.....places for the Successful User Relations Workshop to be held at the Holiday Inn, George Street, London on Tuesday, October 17, 1978. The fee is £50 (plus VAT £4) for members of the IDPM it is £45 (plus VAT £3.80). This covers attendance at the workshop, coffee, lunch, and tea and full course documentation.

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Richard Norton (NORD) Ltd, NORD House, 17 Balfe Street, London N1. Tel: 01-2785509, telex: 299 537

How did you find your first job?

TO SUCCEED as a computer operator, a person needs to have a considerable number of qualities. These include the ability to understand and use the operating system; the fitness to cope with the demands of shift work; and the sense of responsibility necessary to work unsupervised.

So where do companies find the people who possess these attributes or, more to the point, just how do operators get into operations?

Of course, we have the trade papers, such as Computer Weekly, which advertise jobs in abundance. But the great problem is that potential or budding operators are often unaware that such publications exist.

Potential entrants are in a vulnerable position because they rarely know what the work is likely to entail; all they are aware of is that it is to do with computers and, therefore, will have good career prospects. Hence their enthusiasm often leads them to accept the first position offered.

However, there are two government-sponsored schemes which are of considerable value in this context. These are the Training Opportunities Scheme, TOPS, and the Threshold Scheme organised by the National Computing Centre.

Both of these are good because they have syllabuses which are equally strong on theory and practice. Students are sent to sites in order to get an idea of what the job is all about.

Op Spot would like to hear your views on recruitment. How did you enter operations and does it live up to your hopes?

PO careers must be structured

POST Office plans for increasing its dependence on the larger ICL minicomputers on a broad scale must be accompanied by greater career progression opportunities for the operators whose jobs may be placed in jeopardy.

This message came across loud and clear in an interview with Charlie Addiman, who is secretary of the Data Processing Service Branch of the Society of Civil and Public Servants. The branch represents some 1,300 senior operations and project staff in the Post Office.

In theory, it is possible for Post Office operations staff to transfer into programming positions, and vice versa, but in practice this rarely happens, says Addiman.

At the last quarterly meeting of the branch committee this was one of the matters discussed, and the union brought this to the attention of the Post Office management. In response, a circular was sent out to employees stating that certain positions in software support are open to both operations and programming staff.

Said Addiman, "This is fair, because operators are just as qualified as programmers for positions in software support. In fact, operations experience would probably provide a better grounding in this respect."

Members of the union and Post Office management have formed a committee with a view to providing more formal training for the operations staff.

"Union members on the committee have suggested that the operators are sent on a basic programming appreciation course. We believe that this should be followed by one on Cobol."



ADDIMAN

The union is waiting for the management's reaction to this and will follow it up with other suggestions.

Although he is quite satisfied with the progress made so far, Addiman can foresee difficulties for some of the operators who wish to move into the areas of systems and programming.

"Geographical considerations come into play," he said. "At the Edinburgh site, for instance, we do not have systems and programming sections, so if the operators want to move into those disciplines they may well have to relocate to London."

He disagrees vehemently with those who argue that operators require little skill or expertise. "I am not saying that the Post Office holds this view, but it does seem to prevail throughout the computing industry."

Addiman points out that, by the very nature of their work, senior operations staff are often put in positions where decisions have to be made. This, he argues, is good management training.

"When it comes to management, who is going to come off best — a guy who has been in

charge of a night shift, or someone who has come from systems or programming?"

"The shift leaders at our large sites are used to shouldering a lot of responsibility. This experience must be used."

Post Office sites at Derby, Edinburgh, and the Barbican in London already have ICL 2900s installed and Addiman has this comment to make:

"These systems are supposed to require far fewer operators than the machines previously used, but we do not wholly agree with this view. We base our estimations on our own research into the matter and do not rely upon the facts and figures supplied to the Post Office by the manufacturer of the equipment."

Of course, any Post Office activity which directly affects its members is of concern to the Union. And he was keen to stress: "Portsmouth, St Albans and Kensington are three sites which have been in danger of closure in the past. Now, however, we are much more optimistic about their future."

According to Addiman, the introduction of minicomputer systems at its philatelic bureau in Edinburgh. At present the bureau's computing needs are catered for by the Leeds installation.

The union is not against the use of minicomputers as such, providing they are used on the same premises as the machines they replace and operated by the same staff. "We would not stand in the way of progress just for the sake of it. However, great attention must be paid to the operators whose careers may be affected by it."

In fact, he considers that minicomputers will affect operators in the Post Office far less than they will affect those employed by other concerns.

Language range wins varsity order for Nord

LOOKING for an expandable minicomputer system with a wide range of language compilers to equip its new department of computer science, Exeter University has settled on a Nord-10/S system from Norsk Data of Norway.

Language compilers available on the Nord-10 include Coral 60, Lisp, Simula, BCPL, Pascal and the Nord process control language, as well as the usual Fortran, Cobol, Basic and RPG-11. The computer is to be used for teaching and for the study of languages and compilers.

Priced at under £35,000, the Nord-10/S configuration was chosen in preference to a number of offerings from companies which included DEC, Prime and Interdata.

Strengths of the Nord line include the powerful multi-purpose

System 11 operating system, which runs on all models in the line. "We had to know that starting off from a small configuration into one much larger," comments Professor Campbell of Exeter.

Due to be installed in October, the Nord-10/S will be supported by Norsk Data's UK agent Richard Norton (Nord) Ltd of London. It will initially support eight terminals.

First half figures from Norsk Data show turnover up 40% at 62 million Norwegian Kroner (about £8.2 million) compared with the same period last year. Exports accounted for 40% of output. Following the opening of a Paris office in this year, a German office is to be opened this month.

Doctors call for new law to safeguard records

CONCERN over the privacy safeguards relating to the child health databank proposed by the Department of Health and Social Security (CW, May 4) has led doctors to call for new legislation which would make it illegal for unauthorised persons to reveal the contents of medical records.

Dr Michael Thomas, of the Central Ethical Committee of the British Medical Association, which is lobbying for stricter control over the confidentiality of medical records, told Computer Weekly, "We are concerned that in a centralised national databank of medical information there would, under present law, be no legal safeguards to prevent sensitive facts about individuals being revealed by clerks with access to the files."

"We would like to see a law which makes it illegal to reveal not only the contents of an individual's record, but the fact that it actually exists. This would operate in a similar way to the Wireless Telegraphy Act, which makes it illegal for Post Office staff to reveal either the contents of a telegram or the fact that one has been sent by a particular person."

"Doctors are not necessarily against the use of computers in principle," said Dr Thomas, "in fact we believe that computers are the only practical way of storing and accessing large amounts of medical data. But we must ensure that any new system is the most appropriate to our needs, and does not in any way endanger the personal relationship between doctor and patient."

The BMA Central Ethical Committee is particularly worried that the proposed DHSS child health system is to be implemented on an existing bank which makes it illegal to reveal not only the contents of an individual's record, but the fact that it actually exists. This would operate in a similar way

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Avebury warns of dangers to society

WIDESPREAD provision of viewdata terminals in public places could be one way of preventing the use of computers leading to grave social divisions, Lord Avebury told a group of young people last week at the Australian Computer Conference.

As well as criticising unions for not giving a more effective lead in the progress towards a "more leisureed society" (see front page), Lord Avebury also said he believed that the market for micro-based personal computers was more limited than many envisaged, although he saw growing prospects for the use of micro as "business systems" in the home and for the smaller business. The home and office prospects for viewdata services were also great, he predicted, with far-reaching effects, although the ultimate potential of viewdata was difficult to evaluate at this stage.

In addition to the problems of social disruption caused by unemployment, Lord Avebury warned that variations in the ease of access to computer-based information could lead to grave social divisions. "Just as the middle classes take better advantage of public services like health care or libraries because of their attitude to state and local authority benefits and their relatively good knowledge of them, so the same groups in society will be quickest to see the merits of participating in the

exchange of messages would eventually make it as expensive to send a hard copy letter as it is to send a telegram today. The use of paper in offices would plummet, and the era of the huge multi-storey office block would come to an end.

He pointed out that the indirect effects of computers could be of greater importance than the direct ones. In particular, these included the increased power of the military in the superpowers, the social influence of policy decisions based on computer-run mathematical models, and the discouragement of non-conformist thinking in a society dependent on the computer for many everyday functions.

Rightly offered, however, the computer offered the opportunity for a tremendous enhancement of the quality of life, and of the power of the individual. "The route we take and the destination we arrive at," said Lord Avebury, "are still for the human race to choose."

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Not just a pretty face...

A NEW marketing campaign from communications specialists Case of Rickmanworth starts next week, featuring one of the most familiar faces in the computer Press, Liz Rees.

Under the heading "The Case alternative," Liz has been appearing in modern advertisements over the past year, with an invitation to phone her at Rickmanworth.

But Liz is not just a photographic model: she is a product marketing specialist at Case who has an honours degree in industrial engineering and speaks fluent French and Spanish.

Liz joined Case in 1975 as an export marketing administrator. When she was appointed to her current product marketing job, she was asked to handle the phone-in campaign and, according to Case marketing director Christine Stott, it seemed a logical step to use Liz in the adverts.



Sporting a new hairstyle, Liz Rees will be eagerly awaiting multilap phone calls. Plans to dangle her from a parachute to make the point graphically have, we think, been dropped...

"Computer Weekly", "Data Processing" and "Systems International" present

COMPEC'78

Britain's major peripherals and systems exhibition

Olympia, London, December 5, 6 and 7

10 am to 6 pm (closing at 4.30 pm on the last day)

Now in its eighth year, Compec is bigger than ever in its new venue and features a wide choice of computer

peripherals, small business systems and mini and microcomputers. Here are some of the 200 exhibitors:-

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|---|---|---|
| Adair Business Systems
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CAP Microsoft
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Computer Mart
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Elbit Data Systems
Electronic Brokers
Euro Electronic Instruments
Eurocom Data
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Fabrik Computer Components
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GEC Computers
GEC Telecommunications
Geost Minicomputer Systems
General Automation
Geveke Electronics & Automation UK
GNT Automatic
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Harris Data Systems
Harris Systems
Hazelton
Hewlett Packard
Honeywell Information
Hyperon Computers
IDA
Imacon International
International Systems & Applications
Interact Computer Systems
I.S.G. Data Sales
ITT Consumer Products
Jacquard Systems
Jernyn-Mogul Systems
Kerck & Jefferson
Kyratone
K & N Electronics
Laird Data Systems
Licor
Logibex
L.P. Enterprises
Lyons Peripherals
Lynwood Scientific Dev.
Memotec UK
Micro Consultants
Micro Focus
Mini Computer Systems
Modex | Modular Computer Services Inc.
Moshes UI
Nashua Computer Products
National Computing Centre
Nicolet Instruments
Penny & Giles Data Recorders
Pericom Data Systems
Perkin-Elmer Data Systems
Personal Computers
Rexel International
Philips Industries
Plessey
Post Office Telecommunications
Potter Instrument Co.
Prentice Hall
Prime Computer (UK)
Pronto Electronic Systems
Q&A Automation
R & H Applied Dynamics
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Richard Norton
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SEL Computers
SEN Electronics
Set Electronics
Shannon
Sintrom Electronics
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Software Architects
Storage Technology
Sydex Europe
Syr UK
Tarm Synchronome
Tally
Tectex
Tektronix
Telecomputing
Teleflex Computer Products
Texas Instruments
Transdata
Transat Communications
Trivector Systems
Ultrasonic Data Systems
USCI Microsystems
Vanguard Electronics
Wang Electronics
Wangware
Wilcoxon Computers
Willis Computer Supplies
X-Data
Zygal Dynamics |
|---|---|---|

HINT OF THE WEEK

Modifying the printer

MODIFYING printers in the IBM OS/VS1 environment is the subject of a technical hint sent by Richard Peet, an operator at the Nottingham site of the East Midlands Electricity Board.

Peet says, "In accordance with our installation standards, we give special forms a four-digit alphanumeric code — four digits being the maximum allowed on the JCL OUTLIM parameter."

Now if a programmer at the site wishes to test a new print format on plain stationery he codes 1115 and informs the operators of the carriage loop to be used by means of his run card.

However, complications arise when the job concerned has several steps, with each producing output of a different format and therefore requiring several loops.

He continues, "The problem is that the system knows the cor-

rect stationery is on the printer but is unaware of the need to change the carriage loop."

Left to itself, the system will simply print all the datasets without telling the operator to change the loop.

To overcome this, one of the operators might watch the printer and wait for a change in the format being produced. This is both boring and time-wasting.

Peet's answer is neat: "Use the MODIFY command to instruct the system to pause and send the operator a message each time a dataset has been printed."

This is achieved by the following OS/VS1 command:

Fxxx, PAUSE=DATASET

xxx is the address of the printer. He concludes, "When they have all been printed, modify the printer so that it pauses each time a different type of form is required."

These are two of the points highlighted in a report by Rachel Birnbaum, an ergonomist at the London School of Hygiene and Tropical Medicine, entitled The Health Hazards of Visual Display Units.

The report goes on to stress that persons suffering from cataract should never use the units, and that those who wear bi-focal spectacles are unsuitable as they would have to adopt a posture conducive to fatigue.

It points to the direct relationship between eyestrain and the flicker, glare, reflections and varying brightness of the units.

It states that eyestrain is also made worse by personal factors such as general fatigue, ill-health, the use of certain drugs, light-sensitivity and a nervous disposition.

In the normal course of events, there is a lapse between the input of commands or data and the response given by the

system. Rather than giving the operator a chance to rest, this leads to stress as he must remain alert in order not to miss the data displayed.

When overburdened in this manner, VDU operators often complain of stress-fatigue symptoms, including depression, weariness and exhaustion. They also display less efficiency.

In conclusion, the report puts forward some suggestions. They include:

VDU operators should be given regular eyesight check-ups, which should be carried out during their normal working day to produce valid results.

All operators should have regular breaks from the units.

Efforts should be made to ensure that the units are not placed against or facing a window, if they must be sited in the vicinity of a window, then the screen must be placed at an angle to it in order to reduce glare and reflections.

In recent weeks, several readers have contacted me about the course of ergonomics of VDUs to be run by the Institute of Ophthalmology and 12 (CW, February 23).

According to Veronica Reading, who is a lecturer in the Department of Visual Science at the Institute, the course is now fully booked, but another is planned for next year.

The report stresses that there is increased interest in Optical Character Reading equipment for use in conjunction with word processors now that the cost of low reliability and higher cost of OCR have been overcome.

An area that may prove to be the most lucrative, according to the report, is that of electronic mail/fax transmission systems.

"The success of attempts to replace movement of paper by movement of data depends on the communications costs," says the report. "If the cost of satellite communications in particular drops in coming years, the future of electronic mail is bright."

Word processing and related hardware is published by International Data Corporation, 2000, 5th Avenue, New York, NY 10021, USA. Tel: 212 512 2000. Telex: 250000. Cable: IDC.

Store installs 84 VDUs

AN independent mail order firm, Empire Stores, has installed 84 ITT 3280 VDUs at its Bradford headquarters to provide an efficient method of information retrieval, query answering and management decision-making.

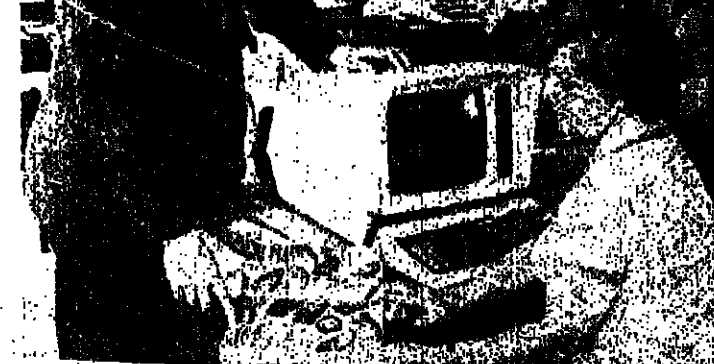
The TRS was developed by IBM in the UK and is likely to be shown for the first time in public at the Sibex exhibition in Paris from September 20/29.

Up to 40,000 orders are received at Bradford each day and these generate about 500,000 documents a week. Catalogues are printed and distributed to agents twice a year.

and each issue contains up to 25,000 different items on offer.

Empire Stores originally opted for a total IBM installation, but felt that the ITT plug-compatible equipment had advantages in terms of lower rental charges and more appropriate screen and character sizes.

Our picture shows Russell Smith, Empire Stores' correspondence manager, advising terminal operator Eileen Beetham on a catalogue query.



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Name: _____
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COMPEC'78
December 5, 6 & 7, National Hall, OLYMPIA, LONDON

DG adds to
Eclipse family

A MORE powerful mid-range commercial system has been added by Data General to its Eclipse family. Called the Eclipse C/350, it slots in above the existing C/330 and provides up to one Megabyte of main memory and I/O data transfer rates of up to 10 Megabytes per second.

Data General has agreed in principle with Nippon Mini-Computer Corp to take a 50% share in the Japanese firm in exchange for granting an exclusive licence to Nippon to manufacture Data General products in Japan.

NCR to set up
micro plant

A THIRD microelectronics research, development and manufacturing plant is being planned by NCR in the US. To be sited at Fort Collins, Colorado, it will be used to design and produce microcircuits for the company's range of computers and business machines.

Building is due to start this month, and the 50,000 square foot facility will have an anticipated employment level of around 200 people. Initially, however, the plant will be staffed by engineers transferred from the two existing microelectronics facilities, in Colorado Springs, and Miami, Ohio.

Cyber 175 for
SIA bureau

MAINFRAME processing power at the SIA bureau is to be enhanced early next year with a CDC Cyber 175 Model 100. The machine will have a 131K 60-bit word main memory and 24 high speed data channels and will be coupled to SIA's existing CDC 6800 to run as a dual system. It will increase the total power of SIA's Cyberpower service by almost 2.4 times, according to SIA.

Midlands access
to Infonet

THE California-based information sciences group, Computer Sciences Corporation, is to open an office in Birmingham to meet local demand for its services. The office will open in January next year and will offer telephone dial-up access at local call rates to the Infonet time sharing service, which is based on Univac 1108 computers in Chicago, California and Washington.

Help for Fiat

A COMPUTERISED financial and management accounting system is now available to Fiat dealers throughout the UK from CMG Computer Management Group (Middlesex). The system, called the Fiat Management Accounting Service, was originally developed for the Fiat Motor Company in the UK.

Standards: oall

LAWYERS controlling privacy and international data flows should be standardised internationally, according to the US services organisation, Adapt. In its submission to a State Department committee, the association said it would soon become uneconomical to operate international networks.

Cost of the book

IN the review of the book, The cost of data processing (CWP, August 3), the price was given incorrectly. This 44-page book cost £8 and is published by the Institute of Cost and Management Accountants.

Finke to head DG
operations in Europe

EUROPEAN operations of Data General will now be headed by Jim Finke, who has been appointed vice-president and general manager of Data General Europe. He succeeds Barry Fidelman, who returns to corporate HQ in Westboro, Massachusetts to fill the newly-created position of vice-president of marketing, Americas/Far East. Finke's previous job was that of

general manager of international operations with the medical systems division of the US General Electric. Before that he was with Motorola, where he held several positions in international and European operations, and most recently was director of international operations, semiconductor division.

Fidelman has been vice-president of Data General Europe since 1973.

Roger Tagg, John White and Eric Cook, management consultants with Scicon, have taken on new responsibilities. Tagg, who has been the company's senior consultant in the database area for several years, takes over the consultancy and IR business. White, who has been leading a data management project, takes over the implementation side and data management in the field of defence. Cook, who leads the management consultancy team, takes on additional responsibility for the data management group.

Joining the group from Cincom Systems, where he was a project leader/consultant, is David Dent, who will be a consultant. Neil Bar-

ton, who was a scientific officer in the British Museum's research lab, has joined Scicon as a senior analyst/programmer, and Timothy Foxon, a senior systems analyst from Rolls Royce, becomes an analyst/programmer with Scicon. Rod Guan joins the support team from IDMS as a consultant.

Patrick Bransfield and Peter Finer have been appointed directors of Pritchard Brown and Taylor. Bransfield, previously chief accountant and company secretary, is financial director; Finer, whose title is now sales director, remains head of ad hoc surveys.

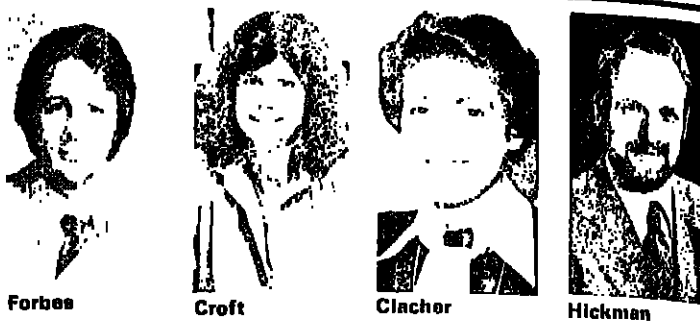


Balloonists get Rascal medals

THE deputy managing director of the Rascal Electronics Group, seen in the middle of the picture, presented silver medals to the transatlantic balloonists, Don Cameron (left) and Christopher Davey (right), for their brave attempt to cross the Atlantic Ocean by balloon.

In addition to supplying the high-frequency radio transceiver, Rascal installed all the radio and navigation equipment used during the flight and provided the vital radio link via RAF centre Upavon, and the control centre established at the Group's Bracknell headquarters.

The attempt, which was thwarted by bad weather, ended when they splashed down 110 miles off the coast of France. At the presentation Davey said, "Our HF set was the only thing we didn't have trouble with. We are very grateful to Rascal for their help."



Forbes Croft Clacher Hickman

Ian Forbes has been appointed by Jacquard Systems of High Wycombe, Bucks, as its European marketing executive, to be responsible for establishing and supporting distributors of the company's range of video computers in Europe. He was previously divisional manager of the packaging department of CZA, a firm of management consultants in market research in Europe.

Susan Croft has been appointed marketing support manager with Advanced Computer Techniques Corp, ACT, in New York. Her previous job was as PR executive with ICL's American subsidiary.

Ken Brayton has joined Borer Electronics as technical sales support manager. Previously he was UK engineering manager with Rascal-Milgo. Dave Dye, a former computer peripherals sales engineer from Ampex, has become senior sales engineer with Borer. Doug Prewer, who was a Post Office engineer, has joined Borer as a field service engineer.

Sales administrator is Sheila Thomas, formerly in sales at Ross Foods; Ann Tuffley, previously secretary/PA to the sales team at Ampex, has joined the Borer team in the same capacity.

Teel Edwards, formerly marketing manager of Dataplex, has been appointed territory manager, word processing systems with General Computer Systems UK.

DIARY

- SEPTEMBER 11-12 Non-invasive cardiovascular measurements conference. NANA/Stanford University, Stanford, California.
- SEPTEMBER 12 Computer programs for project control, seminar. Association of Project Managers, Waldorf Hotel, London WC2 100. Details AFM, 01-789 3182.
- Computers and the unions. Clive Jenkins, BCS 1978 Lecture Series, London School of Economics, London WC2 1930. How do we use it? - how to monitor and control the day in day running of the system. Albert Stacey, BCS Group for New or Potential Users, Royal Angus Hotel, Birmingham, 14.00.
- SEPTEMBER 12-14 Computers in cardiology conference. IEE/Stanford University etc, Stanford, California.
- SEPTEMBER 13 Meeting, CMC Users' Association (CUMAC), 117 Ltd, Saxon Hotel, Harlow, Essex. 10.30. Details: Maldenhead 29525.
- Nascom 1, Alan Toulth, Association of Independent Computer Specialists, National Liberal Club, London SW1 18.00.
- Software house, friend or foe. Vic Groves, BCS Leeds branch, Parkway Hotel, Leeds, 18.30.
- SEPTEMBER 13-14 Scottish Group meeting, IHM Computer Users Association, Eurorest Hotel, Edinburgh. Details Mrs Speciale, 01-551 1643.
- SEPTEMBER 13-15 Very Large Databases conference. IEE/Computer Society/ACM/SMIS, Berlin.
- SEPTEMBER 18-22 Jackson design to language, workshop. Martin Bromberger, Dept of Computer Science, University of Strathclyde, Glasgow. 9.30. Details from the Continuum Education Office at the University, 011 552 5400, ext 2132.
- SEPTEMBER 19 Getting cost control accepted, seminar. Association of Project Managers, Waldorf Hotel, Manchester, Details: M H Drake, 061-228 2011.
- Performance evaluation. Prof P. Sami ICS, Reading University, Copper Inn, Pangbourne, 20.00.
- SEPTEMBER 19-21 CAIB: A computer-aided design and manufacturing conference and exhibition. Computer and Automated Systems Association, Los Angeles.
- SEPTEMBER 20 VME/R subgroup meeting, 2000 User Group, National Liberal Club, London SW1 18.30.
- Micro software, Dick Waller, DPMA Essex branch, County Hotel, Rainford Road, Chelmsford, 20.00.
- SEPTEMBER 20-21 Local Authorities Group meeting, IHM Computer Users Association, Central Regional Council, Stirling, Details Mrs Speciale, 01-551 1643.
- SEPTEMBER 21 Telecommunications - convergence of technologies. Derek Brome, BCS London branch, Waldorf Hotel, Aldwych, London, WC2 18.00.
- SEPTEMBER 21-23 Symposium on interactive techniques in computer-aided design. IEEE Computer Society, Bologna, Italy.



IN the immediate aftermath of Levy's victory over Chess 4.7, it is natural to ask, "When will a computer program beat not just David Levy but the chess champion of the world?" Provided that basic program designs for chess-playing remain roughly similar to those of today, an answer of a sort can be constructed from the chart reproduced here, which I owe to Monty Newborn, author of Ost- rich and chairman of McGill University's Computer Science.

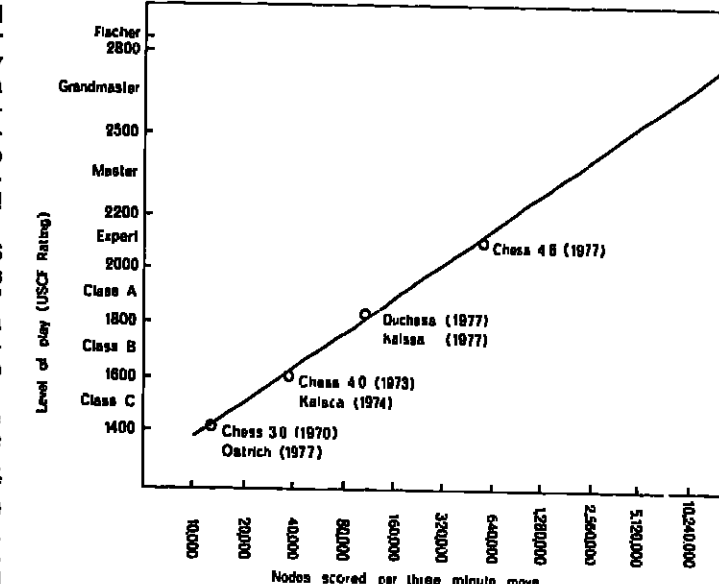
Program strengths in US Chess Federation rating units are plotted against "brute force" search capabilities expressed on a logarithmic scale. A surprisingly good approximation to a straight-line relation emerges. If we were to extrapolate on this scale we would conclude that the world chess champion could be beaten by a program of today's type able to examine 40 million positions in look ahead when choosing each move. This corresponds to a hundred-fold increase of raw computing power beyond today's level.

Advances of computing technology have so far developed a hundred-fold increase in each successive decade, and are expected to do so in the coming decade. So the world championship might be expected to fall to a machine in the late 1980s.

Estimates based on such extrapolations are of limited value. It may, however, be possible to give the calculated conclusion some standing as an upper bound. Two independent factors suggest that extrapolation of the Newborn diagram will underestimate rates of improvement:

A: Advance of hardware only is assumed; programming and database techniques are taken as constant over the period - an unreal assumption.

B: Chess programs are just beginning to probe beyond the depth of tactical analysis of chess-masters. There is a possibility, and some supporting



Relationship between the level of play by chess programs and the size of the tree (after Newborn).

indications, that the disorienting effect upon the human player of the increasingly obscure and tricky styles of play which will result, may be disproportionate. A startling commentary on this second effect was provided in Toronto last year by the attempts of International Masters, Hans Berliner and Lawrence Day, to conduct the attacking side of the King-Queen-King-Rook ending

against a move-perfect machine defence. Theoretically, they should have been able to crush the opposition, but they could not.

They spoke of the upsetting effect upon them of their opponents' bizarre daredevil style, apparently exposing itself to sudden death, for example, by allowing its King and Rook to become separated, and then miraculously surviving.

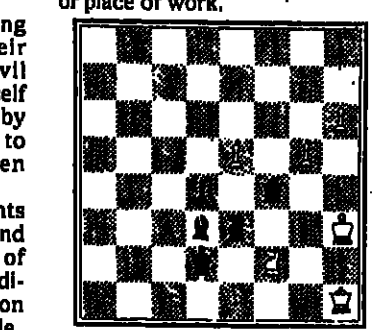
As for effect A (improvements of programming technique and of machine representations of chess knowledge) current indications also favour acceleration of advance on the machine side.

A pioneering contribution by Jean Pitrat of Paris repays study. His program finds deep tactical combinations of the sort which a Master might miss. Its approach is in stark contrast to the "state-of-the-art" designs on which Monty Newborn's chart is based.

Instead of blindly exploring the forward paths, the program reasons its way through the maze, systematically identifying goals (for the program's side) and obstructions (by the other side), the removal of each of which then constitutes an intermediate goal en route to its main goal.

Below is a position taken from Du Mont, together with the published solution and analysis. Pitrat's program does even bet-

ter. Can the reader see how? Solutions will be summarised in the next Chesslab, together with the sender's name and address, or place of work.



White to play

Postscript. A snag in the "upper bound" argument is the possibility of significant improvement during the 10-year period in the standards of human championship play. In particular, deeper insight into the game by masters might accrue as a side-effect of machine analyses. If this were to happen, there could hardly be a more pleasing eventuality, nor one of better augury for extending human intellectual reach in the non-recreational domains of science, medicine and technology.

REFERENCES
A chess combination program which uses plans. J. Pitrat, Artificial Intelligence 8, pages 275-321, 1977.
Computer chess. H. J. Berliner, Nature, vol 274, pages 745-746, August 24, 1978.

'People package' pays off as CPN
chalks up
£1m turnover

Two years after it was set up, Computer People North, the Manchester based member of the VLI computer services group, has achieved a £1 million a year turnover as well as giving rise to Computer People Midlands, which is operating on a £500,000 a year turnover target in its first year.

Most of the turnover comes from the contract staff operations of Computer People companies, with the remainder from recruitment services for clients' permanent staff. Although he believes requirements for computer staff in the North are similar to the rest of the country, CPN general manager Chris Lancashire told Computer Weekly that he feels contract staff in the North place more emphasis on job security than those based in London.

That is why he believes the "people package" developed by Computer People has been a major factor in the success of CPN.

This package is a collection of benefits for contract staff employed by Computer People, including sick pay for up to three months of 75 per cent of the normal pay, bonuses paid in addition to pay as a form of holiday pay, and assistance with pensions and mortgages.

This package also assists clients, Lancashire said, because it provides higher quality and more stable staff. Dave Eacott, who is responsible for CPN's recruitment activities, believes there is a gradual "drift homewards"

towards the North by some computer staff and that, with the current severe shortage of skilled computer personnel, the "quality of life" is becoming an increasingly important factor in contributing to choice of jobs by staff.

Although VLI has had a presence in Manchester for many years, Computer People North was first started as a major commitment two years ago when one of the group's directors, Tony Vickers, moved North to the company's offices in Cheadle, above a railway model shop.

Chris Lancashire joined a year ago and CPN is now planning to move into a ground floor suite in an office block being built in Cheadle, with three times the floor space of their existing premises.

A subsidiary was opened in Birmingham last year, and there are plans to open a Leeds office soon.

Chris Lancashire believes it is vital to have strong local involvement and local understanding of an area, although he also emphasises that it is a great help to be part of a larger group with London headquarters.

Formerly known as Vinson Lamfield International, the VLI group of computer services companies which include the Computer People and Co-Operators recruitment and contract staff consultants and SIL systems house, have now had their name formally changed to the VLI Group Ltd.



General manager of Computer People North, Chris Lancashire, checks on how work is progressing at the new office for his company in Cheadle, Manchester, where CPN will fill a ground floor suite in the new office block.

We're having a Ball!

COMPUTER WEEKLY

CHARITY BALL

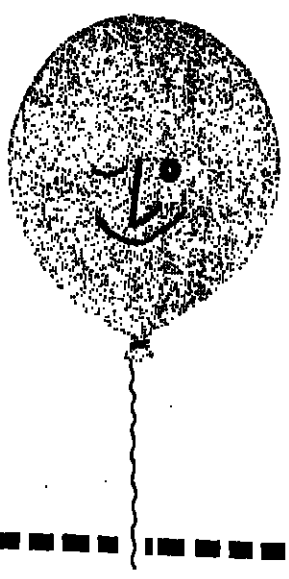
Friday October 13

at the Royal Lancaster

Computer Weekly is holding its third annual Charity Ball. Last year more than 600 people attended what has come to be regarded as the computer industry's big night out.

This year the Ball will again be held under the patronage of the British Computer Society, on the eve of the Society's 21st Birthday.

Proceeds will once more be devoted to a charitable cause within the computer industry. So why not help us to help others, and at the same time enjoy a pleasant evening with friends and colleagues.



COMPUTER WEEKLY CHARITY BALL

ORDER FORM

Tickets are available at £12 for a single ticket. Included in the price is a dinner, cabaret and dancing until 2 a.m.

Please send me single tickets at £12 per head (enter number required)

Please reserve tickets for me (10 places at £12 per head)

My cheque for £..... is attached (cheques should be made payable to IPC Business Press)

When completed this order form should be returned together with your cheque to Chris Hipwell, Publishing Director, Dorset House, Stamford Street, London SE1 9LU

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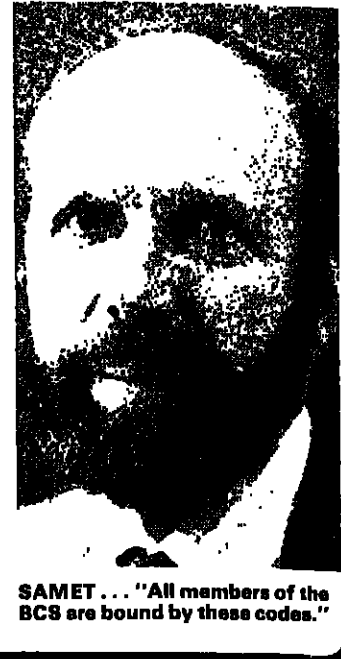
Company

Address

There is a perennial debate in and on the fringes of the computing community about whether there is such a thing as a "computing profession" — and if there is, how it can be defined. Recently, Roger Griffiths of the BCS professional panel made a recommen-

dation for a new grading structure for BCS membership which would give recognition to practical as well as academic qualifications. Continuing the discussion on professionalism, the following article by BCS president Professor PAUL SAMET discusses the

ways in which the BCS codes of conduct and practice aim at helping to define the qualities that go to make a computing professional. The article is based on a speech given by Professor Samet to the Austrian Computer Society.



SAMET... "All members of the BCS are bound by these codes."

How a computing 'profession' can be defined

GEORGE Bernard Shaw tells us, in "The Doctor's Dilemma," that all professions are conspiracies against the laity. As so often with Shaw, the witty phrase has a certain amount of truth but is not always quite right.

There is a well-established tradition for activities involving the public to be carried out under controlled conditions, by persons whose competence can be demonstrated and who can take responsibility for their actions, by risking their reputation and livelihood if necessary. The greater the risk to the public the stricter the control. This is right and proper.

In law and medicine, for example, there are strict systems of licensing and registration. The practitioners will normally organise themselves, to set standards and to train others to work to these, to help the public and, I have to agree with Shaw, on occasions to help themselves, by restrictions of various kinds. Different professions have different beliefs and procedures, which sometimes conflict.

The question I wish to consider is the extent to which such considerations are relevant to those of us engaged in computing. To do so, I have to consider professions in general and their organisation.

Professions, in the sense I intend to use the word, are associated with performing tasks that are specialised, complicated or dangerous and which involve the public, often with some degree of risk. This obviously covers medicine, law,

engineering, teaching and although one often talks of, say, "the theatrical profession" it is not clear to me how such activities fall into my definition. So I shall ignore them.

Certainly, all activities that I include involve an extended

It is not possible to insist on a general restriction that all computing work be done by professionals, just as it is not possible to insist that all typing is done by secretaries.

period of training leading to a qualification, dedication and some measure of control (by or on behalf of the public).

The training I have mentioned is often carried out at an institution such as a university or polytechnic, which is also involved in the qualification process. In the United Kingdom things are not quite so simple, because until comparatively recently (say 1970) universities did not deal with subjects like technology. There were also religious and political restrictions and, surprising as it seems, until 1828, no institution of higher learning in London.

The great hospitals, on the other hand, and the law courts were concentrated in London, and had been for some hundreds of years. This led to the establishment of special institutions for medicine, giving qualifications, and the organisation of the courts led to a teaching, qualification and control system for lawyers.

The engineering institutions are creations of the last century, originally set up to give qualifications and to set up safety standards, for instance in electrical engineering. In Britain we thus have a wide range of methods for people to get professional qualifications of equivalent standard, without necessarily having to go to a university or similar institution. It is important to realise this because it affects the way societies like the British Computer Society are organised and the role we see for ourselves.

It is, of course, quite natural for people with similar interests to come together, to exchange experience, and so on, I believe, however, that what distinguishes a professional society from a self-help club are social responsibility, competence and ethics. These show respectively our care for others, the standards we set ourselves to achieve and the behaviour we expect of each other, especially in dealing with others. More than that, we announce that those who disregard these standards shall not be counted among our members.

Computing is a new activity and appears to present a problem in a discussion on professionalism. Very large numbers of students are now taught how to use computers, from school onwards, and there is at present no general demand from employers for the possession of computing qualifications for a job in the industry, although such qualifications do exist from universities, polytechnics and the BCS, for instance.

It is not possible to insist on a general restriction that all computing work be done by professionals, just as it is not possible to insist that all typing is done by secretaries. There is only one widely distributed skill that I can think of where everyone who practises it legally needs a licence, driving a car, and this is because of the potential dangers.

On the other hand, there are areas where computers are deeply involved and the public has a perfectly proper right to demand the best possible protection. It is easy to give examples: an aircraft with on-board computerised guidance, and landing systems, a nuclear power station under control of a computer system, an intensive care unit in a hospital, a system with personal information. The first three of these can be dangers to life, the last can cause threats to individual privacy.

In all such systems it is important for the computer

component to have the same care and attention as the other parts. If society insists that the other parts are only executed by or under the direction of appropriately qualified personnel, perhaps with licences, the same must apply to the computer parts. This is why we can and must consider standards in computing and why we, in the BCS, feel it is right to talk of computing as a profession, just like the traditional ones.

It was in 1968, after considerable discussion and argument, that the BCS adopted a professional structure, with different membership grades to reflect differing degrees of competence and experience. The discussion and argument have continued to this day. Together with the grading structure come a system of examinations and disciplinary procedures. The grades themselves are to reflect knowledge, experience and responsibility. At present they are:

Fellow; Member, fully professional; Licentiate, technically competent, still lacks experience; Associate, not yet fully competent; Student, undergoing training; Affiliate, not computing professional.

The distribution of the main grades is roughly: Fellow 6%; Member 50%; Student 16%; Affiliate 16%.

This is possibly, indeed, prob-

There are fears already that small numbers of people operating computer systems can have major effects on large sections of the population. A recent British Civil Service study suggests that the government is more vulnerable to action by handfuls of computer staff than to whatever the most powerful trade union can do.

ably, too complicated and we are constantly looking for improvements. The (two part) but of course we also give exemption for people with appropriate qualifications. There are almost 200 courses that give automatic exemption but many others are accepted after individual consideration.

As an attempt at tackling the question of defining what makes a professional, the BCS has developed a code of conduct and a code of practice. The first has been published already, a draft of the second has been published and the final stages of editing are now in progress.

All members of the Society, and especially all professional members, are bound by these codes.

Any code may be considered as a formalisation of experience into a set of rules. A code is adopted by a community because its members accept that adherence to these rules, including the restrictions this implies, is of benefit to all, inside and outside the community alike. A code also has an educational role, by setting out what is required of those wishing to join the community. It may be said that everything contained in an acceptable code is obvious and merely common sense. This, however, does not lessen its worth. The conscious selection and emphasis of a group of "common sense" items on the basis of experience is by itself a worthwhile exercise.

The code of conduct has five points:

- Integrity. Do not claim competence you do not possess.
- Discretion. Respect confidential information.
- Impartiality. Do not claim to be independent when you have a specific interest.
- Responsibility. Do what you say you will do.
- Representation. Do not get personal advantage at the expense of BCS, when you are acting on behalf of the Society.

Of course, all are obvious but there is a need for staff education about matters of confidentiality and technical ability, an achievement is not easy. As adults most of us are against sin but as children we have to be taught about right and wrong.

The code of practice has to be more closely tied to the way things are done and can be done. To be of value for more than a very short time in an area where change is the order of the day it is necessary to abstract essentials. The code covers seven areas:

- Personal requirements. Be competent yourself, be sure your staff are trained to be competent, be ready to improve.
- Organisation and management. Have objectives, match tasks and experience, take care of communication between levels and between equals.
- Contracts. Get expert advice and have a full specification.
- Security, integrity and privacy. Ascertain and evaluate risks, recommend appropriate measures and monitor these in practice; train staff to protect life, data, equipment (in that order).
- Development (Design). Stay within your competence; have standards, of procedure and documentation; involve client; have adequate correction and backup; and above all, ensure technical soundness.
- Implementation. User staff training; appropriate changeover to user staff; proper use of resources.

- Live system. Efficient and reliable; monitor performance and quality; plan for maintenance and enhancement.

At present there is no legislation covering computer work. However, with the spread of legislation concerning privacy, which does affect computer sys-

To ask that all computing activity be regulated is cumbersome, expensive, unnecessary and unenforceable. In the view of the BCS the kind of protection the public desires and to which it is entitled is best provided by licensing and registration of organisations and suitably qualified individuals to perform certain specified tasks.

tems, there will be a demand for controls. There are fears already that small numbers of people operating computer systems can have major effects on large sections of the population. For instance there is a recent British Civil Service study suggesting that the government is more vulnerable to action by handfuls of computer staff than to whatever the most powerful trade union can do.

As a creation of the last 25 years, computing is much more internationally minded than many other activities. It is common for people to work in other countries; they find it easy to communicate with people doing similar work in "foreign" surroundings.

To ask that all computing activity be regulated is cumbersome, expensive, unnecessary and unenforceable. In the view of the British Computer Society the kind of protection the public desires and to which it is entitled is best provided by licensing and registration of organisations and suitably qualified individuals, to perform specified tasks. To be effective, such licences must be enforceable as well as grantable and the conduct of practitioners must be governed by a code of conduct and disciplinary procedures.

It is our belief that the work we have done will be of help when legislation is formulated. The legislation will not enforce membership of the Society, nor should it do so. On the other hand, members of the Society will be ready to take their full place as members of one of the important professions of the present time.

MICRO NEWS

Motorola to offer Pascal on MACS

GIVING further credence to the view that Pascal could become the dominant high level language of microcomputing, Motorola Semiconductor has revealed that this software will be the prime language supported on its new microprocessor, MACS, due to be unveiled early next year.

As yet, there are no plans for any other high level language, such as Fortran, Cobol or Basic, to be supported on the device. The only other software available will be an Assembler. Modules are currently in development to fit the company's EXORCISOR development system, to allow it to be used for software development with the device.

As an intermediate upgrade to MACS, Motorola will also be offering Pascal on its existing 6809 processor chip. The language is already available for the 6800 family from an independent source.

MACS, the Motorola Advanced Computer System, is expected to see the light of day early next year, and to show its lineage with the 6800 family, will probably be officially known as the 68000.

With an estimated 75,000 component elements on the chip, it will be the most complex part yet produced by Motorola or anyone else. Housed in a 64-pin package, to avoid the complication of multiplexing the data and address lines, it will offer a direct memory address-

ing capability of 16Mbytes, using a 24-bit address bus.

It is being designed for operation with existing memory devices, with access times typically around the 300 nanosecond mark and 220 nanoseconds, according to the company, will be more than adequate.

The instruction set totals 61 mnemonic instruction types. These, however, can be combined with a wide range of addressing modes in the device to provide a theoretical instruction set that easily exceeds 1,000 instructions.

In many cases, however, selection of the addressing mode will be carried out automatically by the device. An example of this is in adding dissimilar operands, through an automatic sign extend function. Operands of 8-bit, 16-bit and 32-bit can be worked with, through a wide range of bit manipulation functions.

Though still working at the "paper simulation" stage, Motorola is claiming that the 68000 will be a fast processor. Two million instructions per second is the target operating speed, while the data transfer rate is being set at 500 Kbytes per second.

Multiprocessing is already being seen by the company as an important potential market for the device, and this has been one of the important criteria in the

design of the chip's bus structure. It will be a fully synchronous bus which, according to Motorola, will be able to cope with peripheral and memory devices that are speed limited.

For example, in operations such as memory accessing, the bus cycle will finish when the memory function has been completed, not when a defined time cycle is completed. This adds the possibility that functions performed by devices that are physically separated by some distance can be accommodated.

Like its predecessor the 6800, the 68000 will operate with position independent code.

Several developments are already in the pot for the device, including a memory management chip which should be available shortly after the processor, and a hardware floating point version of the device. This is planned to be a derivative of the 68000 incorporating floating point maths on the processor chip.

Until it is available, a firmware floating point maths routine will be available, but according to the company, its use will not involve any software conversion work on upgrading to the new version.

Simulated benchmarks of the 68000 have indicated that the device will be offering an order of magnitude improvement over competitive processors.

Colleges launch autumn courses on computing

AS the new academic session gets under way, several colleges are launching autumn courses on various aspects of microcomputing and the microprocessor.

At the Polytechnic of Central London, a research course on multi-microprocessor systems is to be held between October 2 and 6. Jointly sponsored by the Poly and the Institute de Recherche d'Informatique et d'Automatique, the main government institution in computing and automation in France, the course will cover, as a major topic, the problems of reformulating the methodologies of current computer networks to cope with the connection and co-ordination of systems incorporating 100 or more microprocessors.

Further information can be obtained from Julia Kessell at the Poly, 309 Regent Street, London W1.

Also scheduled are a series of day release and evening courses, by Merton Technical College, Morden Park, London Road, Morden, Surrey, covering a wide range of aspects in microcomputing.

The first is System Design Using Microprocessors, a 10 week course of one day a week that is aimed particularly at engineers requiring an update in the microprocessor field. It will cover most of the important aspects in system design, including digital systems theory, architecture, interfacing principles, software design, and software/hardware trade-off considerations.

Approximately half the course will be devoted to practical work. It will start on September 25.

For those wanting to learn about the subject from a low level, the college is also running three evening courses. These are: an Introduction to Microprocessors, an Introduction to Microprocessor Software, and a Microprocessor Workshop. The first two are of six weeks duration of one evening per week, and together provide a basic grounding in the subject.

The 12 week workshop will allow students to develop systems and software, using the college's facilities. Further details can be obtained from the course organiser, Bill Wittams.

Newbear to unveil 'personal' Panda

A NEW personal computer system, known as Panda, has been introduced by Newbear Computing Store. It is to have its first public showing at the Personal Computing World Show later this month at the West Centre Hotel in London.

Based on a Motorola 6800 chip, the system features 8 Kbytes of read/write memory, and 8 Kbytes of EPROM. This normally will hold an advanced Basic interpreter.

A full Ascii keyboard is provided for data entry, and the system also incorporates a nine

inch display capable of showing 16 lines of 64 characters each.

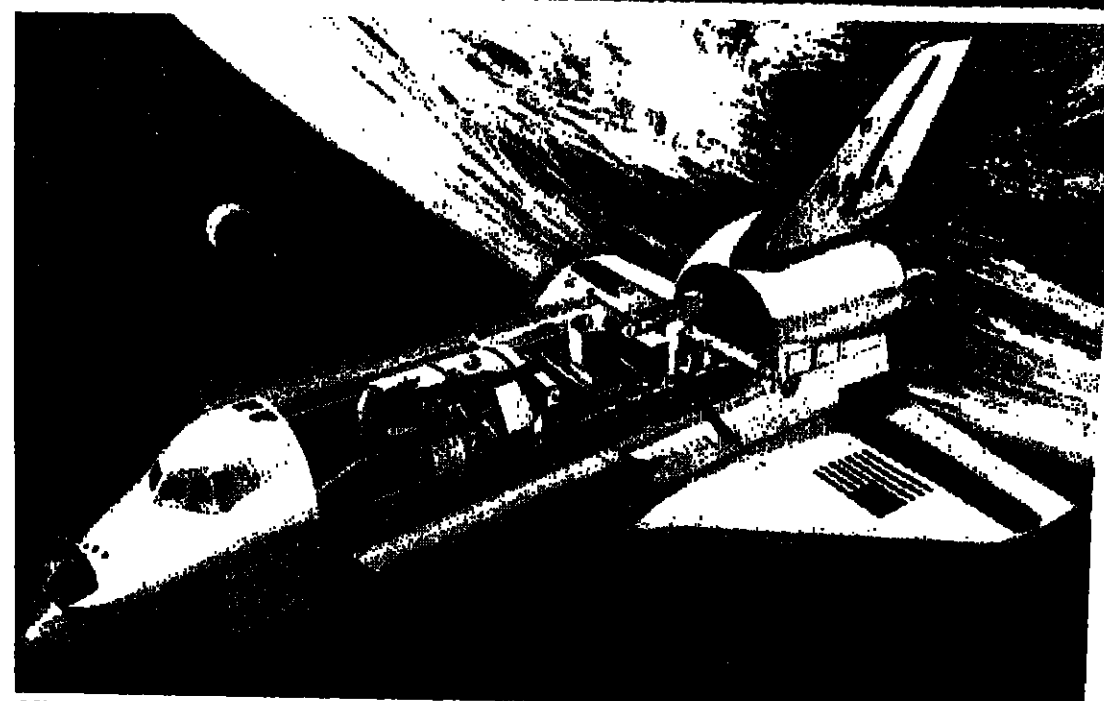
A prototype of Panda was first seen at Newbear's stand at Microsystems '78, and although the production version is slightly larger, at 12 inches wide x 20 inches deep x 11 inches high, it is still one of the smallest systems currently available.

Interfaces for audio cassette, and serial RS-232C/V24 are available for the system's 80-way bus structure, together with a TTL compatible parallel input/output board based on Motorola's peripheral interface

adapter.

The baud rate of the serial interface is programmable between 110 and 1,200 baud, and the system can also be used as a remote terminal to another computer system.

In addition to the normal facilities of an 8K Basic, Panda's firmware interpreter offers refinements such as multiple statements per line, cassette file handling, user definable string length, and a Trace debugging facility. Error messages in the language include coverage of incorrect line numbering.



AN artist's impression of the Shuttle spacecraft, which will be the home of the joint US-European Spacelab project. Among the early experiments planned is research into the production of electronic materials, such as circuits.

Solid state research in space

FOLLOWING the news that the Russians have been carrying out research into producing semiconductor materials in space (CW1, August 3), the American National Aeronautics and Space Administration has revealed plans to perform similar work as part of the Spacelab project.

Due to be launched in 1980, the Spacelab will carry with it a range of material processing experiments, some of which will relate to the production of electronic materials.

Negotiations are currently taking place between NASA and TRW Defence and Space Systems Group, which will be acting as prime contractor in the development of the experimental equipment required for the missions.

Details of the actual experiments have yet to be finalised, but if the efforts of the Russians are any guide, the growing of more complex semiconductor materials, such as indium antimonide, will be high on the list.

The most recent experiments completed by the Russian Cosmonauts in Salyut 6 have included producing semiconductor compounds based on cadmium selenide, gallium arsenide, and indium antimonide.

The long term importance of this work which for the time being, at least, gives the Russians a theoretical lead in advanced semiconductor research, is that crystals produced in zero gravity offer several distinct advantages over those grown on earth.

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IBM reorganises as prelude to two new series

RECENT organisational changes at IBM are a prelude to the announcement of new E and H series models (CIV, August 31) and also, some observers believe, possible preparation for the break-up of the IBM into autonomous divisions or even independent companies.

In any event, the changes are more than merely for administrative convenience, and are strong indicators of IBM's likely future directions.

One of the most detailed analyses of the nature and meaning of the changes has been prepared by the Technical Analysis Group of New York consultants Advanced Computer Techniques. The study is entitled IBM Systems in the 80s.

A key aspect of the new IBM organisational structure, according to the ACT study, is the dividing of the Systems Product Division into two separate divisions, one still called Systems Product Division responsible for all current and future intermediate-scale processors including the E series and related software/microcode; and the other called Data Systems

Future of the 370

PLUG-COMPATIBLE mainframes are "likely to be short-lived" because new machines from IBM will use architectures very different from those of the 360, 370 and 303X series computers, according to Industry Measures, published by the Technical Analysis Group.

Without a new architecture, ACT does not believe IBM could maintain a 13 to 14% growth rate during the next decade.

Industry Measures says that the 370 will continue to be actively marketed for the next two years. Most of the PCM companies have systems in the field and will do well during that period. One possible exception is Control Data, which is late with

delivery of its Omega line. So, for the short term, the PCMs will enjoy brisk sales, greater, according to ACT, than the combined sales of all incompatible mainframes.

The test of the PCMs will come with the first shipments of E and H-series processors. Some add-on and processor makers will be able to keep up, after a year or more of development effort, but others will be left by the wayside.

Users who own plug-compatible equipment should have no trouble relieving continued support and, if price competition continues, they may well stay with the obsolete but increasingly economical architecture of the 370 series.

that Papes was "responsible" for the unexpectedly high demand for the IBM 3030 line (CIV, August 31).

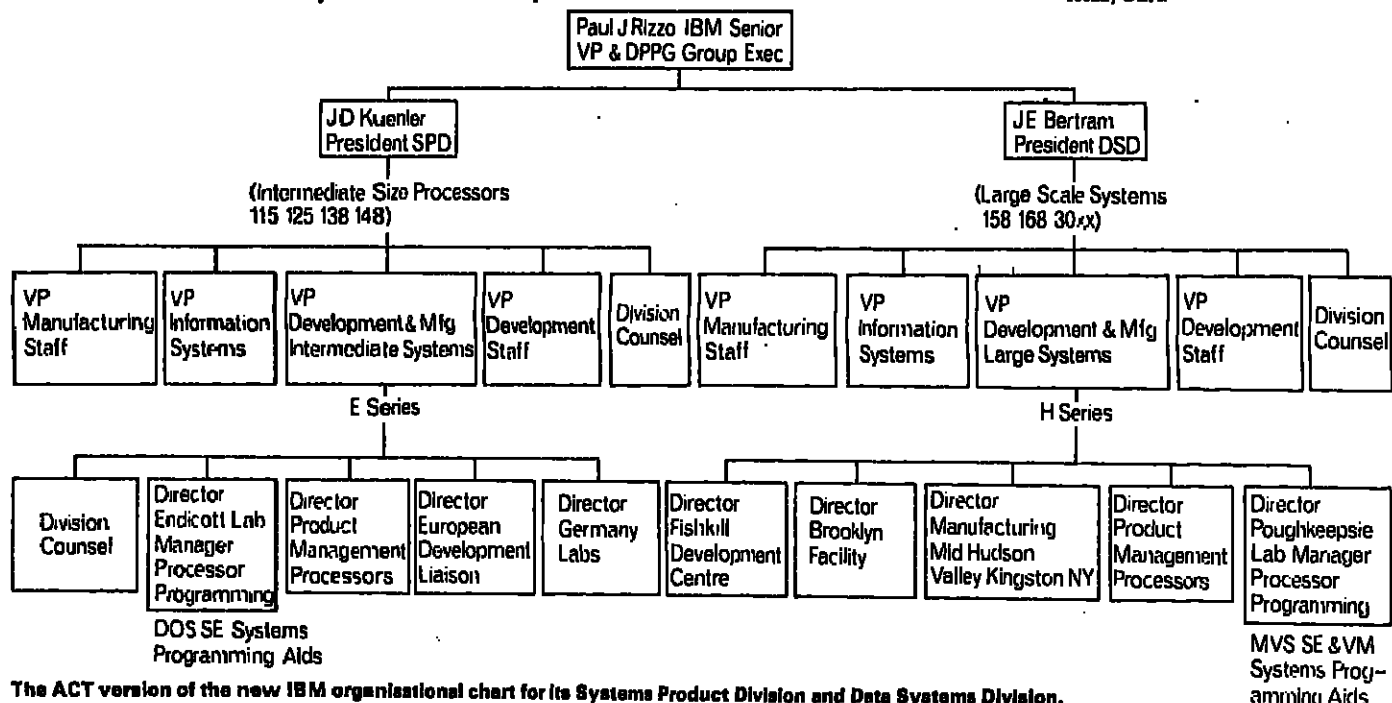
It is also Fertig's view that software and hardware development groups have been joined under the new organisational plan so that shifts in systems functions may be more easily accomplished.

Both SPD and DSD include their own processor, programming and systems software (including microcode) capability indicating, Fertig suggests, greater interlocking of hardware, firmware and software functions in future products.

ACT claims there is a distinct difference between groups working on the low-end mainframes — the imminent entry-level E series, and the high-powered H series, expected to be announced later.

"IBM Systems in the 80s costs about \$5,000 for the full report but excerpts are available for less. For further information contact Robert Fertig, Technical Analysis Group, Advanced Computer Techniques, 437 Madison Avenue, New York, NY, 10022, USA.

Paul J. Rizzo, IBM Senior VP & DPPG Group Exec, says the new organisational structure, according to the ACT study, is the dividing of the Systems Product Division into two separate divisions, one still called Systems Product Division responsible for all current and future intermediate-scale processors including the E series and related software/microcode; and the other called Data Systems



The ACT version of the new IBM organizational chart for its Systems Product Division and Data Systems Division.

DG multiplexer advances

A FOUR line asynchronous and a single line synchronous controller have been combined on a single multiplexer board by Data General.

The ULM-5 universal line multiplexer is a 15 inch square printed circuit board that occupies a single slot in a Data General Nova or Eclipse chassis. It is software compatible with Data General's ALM and SLM series multiplexers and is supported by their operating systems.

On its own the four line asynchronous controller comes as the model 4241 at \$2896, the same price as model 4242, the single line synchronous controller, on its own. Together as the ULM-5 model 4243 it costs £1,728.

Moss system spearheads £35m railway line diversion

A COMPUTER-BASED highway design called Moss (Modeling System) is to be used by Durham County Council to assist British Rail in its plans to divert part of the London to Newcastle railway line to avoid National Coal Board works at the Selby coalfield.

If the £35 million scheme were not carried out British Rail says that its 125mph trains would have to reduce speed between

Doncaster and York, and increase journey times unacceptably.

Developed in co-operation with the Northampton and West Sussex local authorities, Moss enables 3D highway models to be displayed on a graphics terminal and for this Durham uses a Tektronix 4414 terminal linked to a 1 Mbyte IBM 370/138 which runs VM/CMS. It has been in operation since 1976.

Council lettings automated

A COMPUTER-BASED system for handling the letting of council houses is to be set up by Leicester City Council.

Based on the council's IBM 370/138 the system, expected to

cost about £100,000, will help in the processing of applicant information and the suitability of available accommodation. It will also be linked to the present rent accounting system.

"When it is introduced, the new system will make a vast amount of difference," said a council spokesman. "The old manual system involved a lot of paperwork and filing, but the whole letting procedure will be faster and more efficient."

Business show

The first screen word processor from BDP of Isleworth, which has hitherto dealt solely in hard-copy machines, will be one of the items on show at the London Business Equipment Exhibition from October 24 to 27. Organised by BETA, the show will be held at the Connaught Hotel.

£100m floppy discs order

FLOPPY disc drives valued at about £100 million have been ordered from BASF UK by Research Machines, the Oxford-based microcomputer manufacturer.

The drives are for Research Machines' 3802, Zilog 280-based system.

The order covers both standard and minifloppy drives.

Nick Hollis, of BASF UK, said that the order was the largest taken since the UK operation took over marketing of OEM products in this country.

Takeover

WORD processor manufacturer Wang Laboratories of Lowell, Massachusetts, has agreed in principle to buy Graphic Systems, a maker of phototypesetting systems, for \$1.9 million.

Bureau upgrades to dual 2960 running under VME/K

A PROGRESSIVE switch from a 1903A and a 1903T running under George 2 to a dual 2960 running under VME/K is planned by Hunsbury Computer Services, the bureau offshoot of Blackwood Hodge.

The first 2960, with one Megabyte of memory and 800 Megabytes on disc will be installed at a new computer centre

in Northampton in a year's time, and the second will follow one year later. Once the first 2960 is installed, the DME operating system will be used to support the 50-dot Blackwood Hodge communications system during the prime shift, and during the other two shifts, programs will be converted to run under VME/K.



Weather satellite images on display

LIVE satellite images of the weather over the North Atlantic and Europe are being displayed at the Farnborough International Exhibition this week by the system developed in the UK by the Data Systems Group of Gresham Loan Ltd.

The digital images are from the European Space Agency's Meteosat satellite and are being received by a three metre dish aerial on the roof of the Department of Industry stand at Farnborough.

The Gresham system includes a Digital Equipment PDP-11/04 which is programmed to store on a fixed head disc drive all the 8-bit elements, or pixels, that make up each image. The computer can then display the complete image on the system's TV monitor or zoom on to a particular section of the image by selecting and displaying all the pixels that make up that section.

Another important facility provided by the software on the PDP-11/04 is adding false colour to the monochrome image received from the satellite. The colour assigned to any segment depends on the intensity of the shade of grey.

The system can also store up to eight colour or 32 monochrome images and display them as an animated sequence.

The system at Farnborough is a modification of a Gresham image processing product already used in body scanners and for military applications.

NEWS IN BRIEF

Arbat opens Kent centre

SYSTEMS house Arbat, which specialises in banking applications on PDP-11 minicomputers, has opened a research centre in Ashford, Kent.

The centre is equipped with a Digital Equipment PDP-11/70 minicomputer, and will be headed by new R&D director Peter Farcey. He has been a consultant to Arbat since 1972 and developed the ARMS operating system and programming in software in collaboration with Doug Schilling.

Water board link-up

A COMPUTER system to monitor and control water supply, sewage treatment and river management is to be installed by the Wesssex Water Authority. Suppliers of the equipment will be Serck Controls of Leamington Spa and, when fully operational, the system will provide an interlinked control and data collection system covering 70 outstations in three districts.

Vindicated

STANDBY arrangements for an online database system in Edinburgh were vindicated when work was successfully transferred for a day to an IBM 370/188. The implementation — thought to have been the first such operation in Europe — was carried out under an agreement made last year between SCL and the Scottish Widows' Fund and Life Assurance Society, which 370/145 was down for repair due to software problems.

Retrieval

A MEETING on the use of intelligent terminals in information retrieval is to be held at the University of September 27 at 2. It has been organised by the BCS Specialised Group in Information Retrieval. Speakers will include David Bagley from Hatfield, Robert Phillips from Hatfield, and John Williams from Hatfield. The British Library, 840, is the sponsor.

How micros will change the face of computer design

"I CAN'T find any commodities on this planet that simultaneously give better performance, less cost of ownership, consume less power, or that are more reliable." Speaking at Hewlett-Packard's semiconductor sapphire programme, could be talking about the latest offering to roll off General Motors' production line, but is in fact describing how he sees the ubiquitous microprocessor.

Up to 20,000 integrated circuits a month of various kinds are produced at the facility and it is the axle around which much of the company revolves, as Lopp explains.

"We are essentially a supplier of CMOS and SOS components to other Hewlett-Packard divisions," he said. "And what we are doing with this technology is replacing the way we design and build computers. In the past we have thought about integrated circuits as an element in the hardware, but we are at the stage now where the integrated circuit is the hardware."

"By 1985/90, somewhere in that time-frame, that's how you are going to make computers. There may be printed circuit boards and there will still be sheet metal around the box, but the electronic functions will be done by integrated circuits — totally."

On the semantic issue of what to call such computers, Lopp has this to say:

"With LSI and VLSI technology, we are very close to the point where it is actually possible to create a real computer on a single chip. Whether we call them mainframes, minicomputers or micros doesn't matter — that's a marketplace issue."

"Microprocessors have been defined as the sort of thing you find three to four inside model aeroplanes, TV games, automobiles, or medical instruments."

"The definition we use here at Hewlett-Packard is very different because it is not very dependent on the hardware base. It is dependent instead on the application of the product rather than how to create it. So in our context, a computer is the thing that does the set of tasks we have decided to provide for our customers, whether it is a micro or a minicomputer."

Giving an explanation of why integrated circuit technology is superb at assuming new guises, Lopp said, "A statement I would make with a very high degree of assurance is that as fast as we are going to be made with LSI and VLSI chips. There is general agreement on this here in Silicon Valley. It is an applications area; computers is more than we need forced to evolve faster than we can figure out how to use it. How many gates would you like on a chip? ... How fast would you like the gates to be?"

Nine different circuits are currently produced by HP, six of which are the company's Micro Computer Chip (known as MC) family designed specially for control applications. About 20 other designs are in progress and although none of them is currently intended for sale outside HP, it has not ruled out the possibility of offering SOS circuits to other companies.

Lopp describes the state of play regarding packing density on a chip. "In production we are at 25,000 devices easily on a chip," he said, "and in development, which tends to be two to

three years out, we are at four to six times that. We are also working on concepts that will utilise several million devices in a circuit. The available complexity is very impressive, however."

"For example, take one of our minicomputers and separate it into the intelligent portion, the memory portion, and the stuff that is stored in the I/O portion — we can put any one of these three functions on a chip and in many cases end up with more capability than is required."

This ability leads to some interesting conclusions.

"So what we can talk about," said Lopp, "is adding value in the future life of the product. I don't know how we are going to do it,

half a million rectangles and that's not a very pleasing job. In fact, it's the kind of job you look at and immediately convince yourself that the computer is a whole lot more capable of doing it than we are. They don't tire or get bored. It's the class of job you can delegate to the computer and then use the human for what he is good at — the more creative and innovative tasks."

"What we are trying to create for the designer is an environment where it is a creative and intellectual challenge to design an integrated circuit, not drudgery."

But there are dangers in off-loading work on to the computers, as Lopp is well aware.

As films are linked with Hollywood, so semiconductor are immediately identified with Silicon Valley, where one of the cast of stars is Hewlett-Packard.

Sited on Stanford Industrial Park land, HP's semiconductor facility uses its 30,000 sq ft of clean rooms to develop and manufacture SOS silicon on sapphire, and CMOS, complementary metal oxide silicon, circuits for products

ranging from electronic test equipment to mainframe computers.

Finding out the problems of producing these micro jigsaw puzzles, ROBIN WEBSTER went to Silicon Valley to see Larry Lopp, engineering manager of Hewlett-Packard's SOS programme.

Lopp believes that with microprocessor technology, the changing face of computer design will change even faster.

"We are now taking the steps that put the computer in as an active participant in the manufacturing process," he said. "I don't see it as a large technical challenge to be able to do this, but it is a pretty important social issue on whether our labour force is going to feel good about this computer telling them what to do. I think you have to move slowly in these environments."

To make full use of integrated circuit hardware, it is essential to match it with good software, which has its own price to pay. "The real value of the micro is the technical ability it allows, but it takes an understanding of that to customise it to particular applications — and that understanding typically comes from software companies, people who know how to use it. So the micro costs you a buck-and-a-half, but it costs you \$3 million to get into the business of applying these things."

"You can do an analogy with the educational system," said Lopp. "If you have a lot of children who don't receive education, it is unlikely that you are going to have a lot of happy, useful citizens. The hardware is there, but it is stupid. Somebody has to train it and that essentially is what software does; it trains and focuses the power of the hardware."

What sort of training is HP giving its own hardware? "In the past, most of our activities have been to understand and control the relationships of different boxes and the internals with one another and provide a reasonable language for them."

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"You can do an analogy with the educational system," said Lopp. "If you have a lot of children who don't receive education, it is unlikely that you are going to have a lot of happy, useful citizens. The hardware is there, but it is stupid. Somebody has to train it and that essentially is what software does; it trains and focuses the power of the hardware."

What sort of training is HP giving its own hardware? "In the past, most of our activities have been to understand and control the relationships of different boxes and the internals with one another and provide a reasonable language for them."

"We are now taking the steps that put the computer in as an active participant in the manufacturing process," he said. "I don't see it as a large technical challenge to be able to do this, but it is a pretty important social issue on whether our labour force is going to feel good about this computer telling them what to do. I think you have to move slowly in these environments."

Lopp: "Computers are so magic."

age capability for the customer to instruct the machine. That's where we have been historically.

"However, I quickly found that all the internal stuff had been relegated to LSI chips, and so if you wanted to connect this box with that one you just put an LSI chip in there. That's the end of that; you don't have to do any programming because it is already taken care of for you."

"Our activity has moved up a level now, and we are making the language more appropriate — a 'friendlier interface' is a term we use a lot. We are also starting to do much heavier applications work specialising collections of hardware to particular jobs."

"It's tough to do that. For example, take a business computer and present it to a company and say this is your working process, your inventory management system. They may not agree with the set of choices we have made. So in the applications area you are getting into the inside workings of a company, and it's risky. They may choose to do the job differently from your way of thinking."

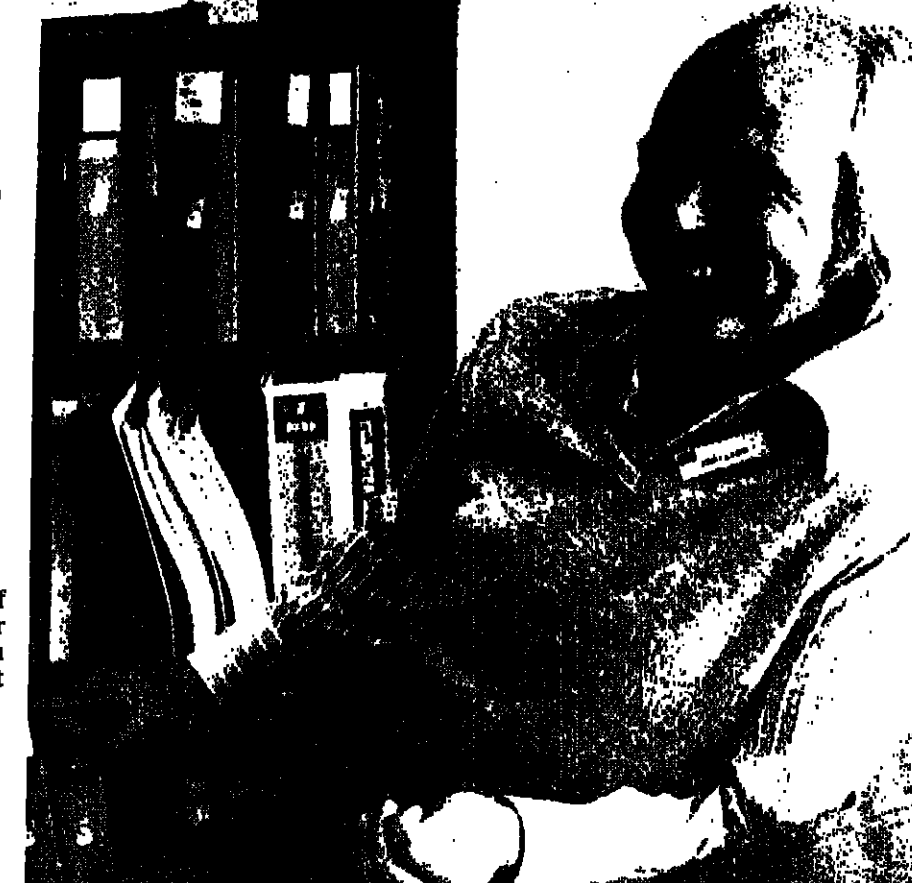
Lopp did feel, however, that Hewlett-Packard was in a good position to reap the benefits of all the expensive development work that has gone before.

"I think we are at a point now which is rather unique in HP's evolution," he said. "We have spent ten years trying to figure out what technology we need, how to manage it, how to apply it, how to make a buck. It's the game we play, and we might as well play it with a consistent set of rules. We have spent a lot of money doing that, a lot of time. I think we have a solid evolving sense of how to integrate these things into a business. So we are sort of coming out of the acquisition and research and development phase in HP and moving into the exploitation — the business exploitation of the capabilities."

Part of this exploitation undoubtedly rests on educating people in the computer's abilities, showing what it can do for them. But Lopp felt that there was still a barrier here that had to be overcome.

"There is, I think, a fairly unique thing in computers, because they are so magic; they have a 'gee-whizz', aura. They put people off; you see it all the time. The typical layman is afraid of the technology, and that's a bad situation to be in."

"I don't care if nobody knows how the computer works; the question is: 'Is it performing the function we've relegated to it in an efficient, caring way?' You've got to get people up to the point where they can understand the application of the technology, not necessarily how the thing works."



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In the past three years, computer services companies have sprung up all over India. Most have already forged links with US mainframe or minicomputer manufacturers, but three of the

larger and better established companies, Shaw Wallace and A. V. Thomas in Madras, and Datamatics in Bombay, as yet have no foreign associations. Tim Palmer continues his Indian report.

Services companies look for links with the Western world

AMONG the Indian computer services companies hoping to do business with their counterparts in Europe are several which as yet have no formal links with any US or European organisation, East or West.

Shaw Wallace Computer Services in Madras is one of the largest. An offshoot of the Anglo-Indian Shaw Wallace and Company, itself a member of the Sime Darby group, it runs a ser-

vice bureau on an ICL 1901A computer in Madras, and offers complete facilities management services to other Indian companies.

Shaw Wallace plans to replace the existing computer with ICL's new 2950, and also has access to IBM 370 and 360, Burroughs 1700 and DECsystem-10 mainframes, and programmers experienced in Cobol, Fortran, PL/I, Plan and Autocoder.

The company is keen to take on programming, conversion and data preparation work for foreign clients, and is particularly interested in joint ventures in the Persian Gulf, where it plans to open a service bureau.

On the data preparation front the company guarantees a turnaround time of 12 days including transit time, pointing out that the international airport at Madras has good intercontinental links. It claims that its charges for punching, verification, validation and encoding on to magnetic tape of data are 50 to 70 per cent of those in the US and Europe, including the cost of air freight.

Its most important overseas contract to date requires it to develop and install a data collection system involving some 25 Datapoint processors for Sime Darby plantations in

Malaysia. Data will be collected offline, but ultimately it is intended that all the processors in the field will be linked to a mainframe planned for installation at head office. Projections indicate a major improvement in profitability as a result of freeing managers from time-consuming paperwork.

Across the country in Bombay, one of the most ebullient and confident figures on the Indian data processing scene is Lalit Kanodia, founder and head of Datamatics. Kanodia worked as a consultant to both Ford and Arthur D. Little, worked on Project MAC at the Massachusetts Institute of Technology, and founded Tata Consultancy Services, India's premier computer services company, before leaving to set up Datamatics.

Problems simply do not exist for Lalit Kanodia. "I can give you a decision on behalf of Datamatics in 48 seconds," he says, in between reeling off statistics about his company. "Gross National Product is \$70,000 million; we have the third largest technical manpower and the largest number of unemployed graduates in the world. We also have the cheapest manpower."

Datamatics employs 150 people, 40 of them computer professionals. It has three IBM 1401s in-house and, like everybody else, buys time on most of the third generation machines accessible in India.

"Our turnover is \$1 million, but the equivalent work value in Europe would be \$5 million. Our business is 100 per cent computers, and 1978 is the year we intend to go international."

Datamatics is currently in consultation with four US companies about taking on the Indian distributorship for their products.

Kanodia declined to name the companies but they are understood to be Prime, Modcomp, Harris and Wang.

"Our future plans include putting in two or three one Megabyte minis of our own, and we are seeking access to large third and fourth generation machines for software development."

Kanodia is also looking for high-volume data preparation work. "We are thinking in terms of jobs involving five million cards. We would guarantee 99.9 per cent accuracy, and provide a one to two month turnaround. In the US, the charge is 20 cents per 80-column card record punched and verified. In Taiwan, it costs 10 cents. We can do it for 4 cents a card," he says. "Conversion and data preparation are easy and savings are 80 per cent. On-site work is harder, but using Indian personnel would still save 50 per cent of the cost."

The business Datamatics is seeking overseas include the supply of trained manpower for periods of three months to a year; contract programming; collaboration on joint projects; conversion; and data preparation.

In India we would charge \$50 per man-day for a senior programmer with five to 10 years' experience; in the US we would charge \$100 a day plus travelling expenses.

"Half our people have worked abroad and we have taken 60 per cent of the new services contracts in Bombay, and we have only lost one client in three years. We handle the accounts for Thomas Cook and Diners Club in India, and sorted out the problems of the State Bank of India on its IBM 1401."

There are, however, some disadvantages to using tape. Because the tape stores information sequentially, the user must collect information in batches before it can be put on tape. Batching and searching with tape is very time-consuming for some applications.

These disadvantages provided the impetus for the next entry in the storage hierarchy, namely, disc. With disc data storage, the user can directly access a particular data record.

Disc data storage, introduced in 1956, offered five Megabytes of storage, 100 bits/inch, and a data rate of 10 kilobytes/second. Disc storage needed to keep pace with the developments in the computer, spurred by the advent of semiconductors which increased storage demands. Storage requirements continued to surge with the introduction of IBM's operating system, making multiprogramming and multiprocessing possible.

As technological advances in computers created the need for more storage, technological ad-

Advances in storage made greater capacity available. Increased disc density and capacity per spindle offered customers reduced costs per Megabyte of online data, and in fact a reduction by a factor of two-thirds was made in four years. Since 1970, just prior to STC's entering the disc market, the price of disc storage per Megabyte has again been reduced by two-thirds. Continued improvements in data rate, together with reduction in access motion time and rotational delay, and improved reliability have made computer systems practical for more users.

Not insignificantly, technological advances in the high-speed access products have also reduced costs. Four kilobytes of add-on memory were priced at \$300,000 in 1960. Today, the price for a Megabyte of memory has been reduced by more than a factor of 10. The developments in memory have coincided with an increased need for storage and a complementary reduction in cost.

It is a widely accepted belief that the storage hierarchies will not change substantially in the next decade. To date no single storage technology has been discovered that meets all the performance requirements of

large processors, provides for data sharing, and at the same time presents a reasonable cost for storing data, comparable to tape. The real challenge facing today's manufacturer is to offer storage products that provide for all three.

We also anticipate an increase in the number of storage levels within the next five years, to fill the gaps that now exist in the price/performance spectrum. Building upon the current storage hierarchy consisting of memory, disc and tape, future hardware will possess at least five levels, Figure 1.

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In the technology area, we maintain that existing technology, namely semiconductors and magnetic recording on both disc and tape, will remain the dominant storage technologies for the next 10 years. Storage will slowly tend to migrate toward solid state devices as the price of memory is reduced relative to other technologies.

However, considerable time and money will be spent on refining densities, speed, cost and reliability in disc and tape. For example, in five years we expect to see developments in the high performance disc area that include access time of less than 20 milliseconds, and costs of approximately one-half of today's prices.

We also expect an emphasis in the low performance/low cost disc area. With increased capacity reaching several billion bytes per spindle, these disc subsystems will have slower

MAGNETIC STORAGE MEDIA

Cutting the costs and increasing the speed

The world of magnetic storage media is characterised by steadily falling costs per bit in most established technologies, such as semiconductor, main memory and rotating memories, and also by the development of interesting new methods of storing data. Some of these new devices, for example charge coupled devices, are now being incorporated in commercial products, while electron beams and lasers show promise in the longer term for reading and writing data.

This special section on storage media includes an article by Vernon Bluhm, manager of amorphous devices at Burroughs, in which he describes an interesting new semiconductor technology called ovonic memory. This is a completely non-volatile device that employs amorphous semiconductor material. John Moore, manager of European operations for Nashua Computer Products, discusses the continuing development of the floppy disc; and in this first article, Colin Madeley, north European sales director of Storage Technology, looks at the hierarchy of storage products that ranges from expensive fast access main memory to high capacity disc and tape storage with very low costs per bit.

By Colin Madeley

CONSIDERED by many to be as important to human development as all the inventions and innovations introduced during the first 150 years of the industrial revolution, the computer has literally revolutionised our society. The impact on our entire civilisation, and on business, government and the political processes in particular, is staggering.

The driving force behind these technological miracles was the need for data storage advances. By significantly cutting the cost of putting data online, these technologies have helped to move the computer directly into the spectrum of our everyday lives. It has been a truly astonishing advance.

Before elaborating on current spectacular technology, a brief review of the impact which data storage advances have had on the data processing industry is indicated.

In fact any review of the history of data storage will of necessity be brief and cover a relatively short life span. The roots of data storage lie in magnetic tape, the high-speed alternative to punched cards. Contrary to what most people expected, and indeed forecast, magnetic tape has weathered three decades in a rapidly

changing industry. As perhaps the ideal sequential access device, tape's capacity has increased from 200 bits per inch to 6,250 bits per inch, and it is the most cost-effective storage medium.

There are, however, some disadvantages to using tape. Because the tape stores information sequentially, the user must collect information in batches before it can be put on tape. Batching and searching with tape is very time-consuming for some applications.

These disadvantages provided the impetus for the next entry in the storage hierarchy, namely, disc. With disc data storage, the user can directly access a particular data record.

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However, considerable time and money will be spent on refining densities, speed, cost and reliability in disc and tape. For example, in five years we expect to see developments in the high performance disc area that include access time of less than 20 milliseconds, and costs of approximately one-half of today's prices.

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Terminal input/output is faster because of improvements to routines moving data to and from terminals; and buffer size has been increased, too.

Use of disk space is now more efficient. One innovation is the use of a special firmware technique to locate data in core without a large search.

Expanded main core is now available to 128K. Addition of main memory is, among other things, an inexpensive way of expanding the number of 'responsive' terminals.

ROYALE

REALITY ROYALE's new **process scheduler** allows users to ensure maximum performance where it's needed most - big batch jobs can be prevented from slowing down inter-active work (data access, data entry, etc.) by giving them lower priority.

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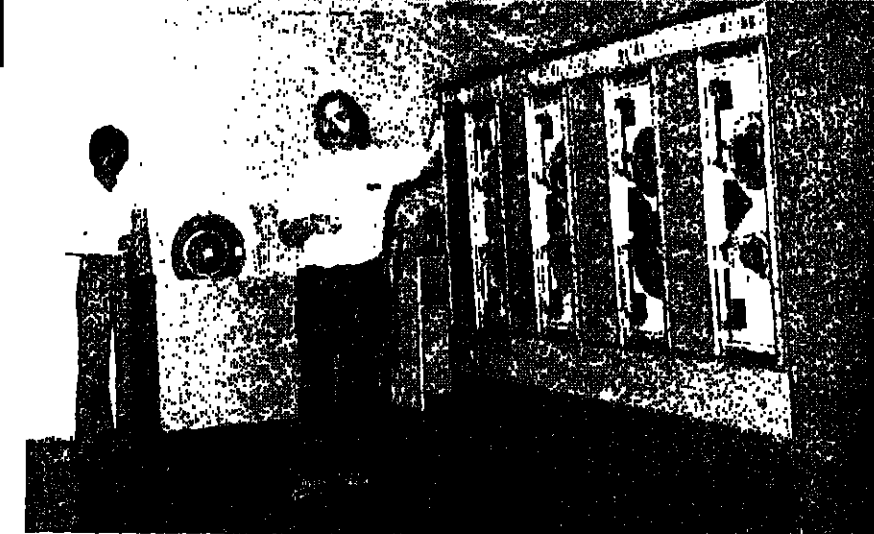
In October REALITY ROYALE manufacture begins at CMC's Hemel Hempstead factory which is also being expanded to cope with demand for SOVEREIGN, CMC's recently announced data entry system.

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A mainframe computer is a valuable piece of hardware in any country, but no more so than in India. The picture shows a shoeless Tim Palmer making friends with the Indian-built ICL 1901A computer at Shaw Wallace in Madras. Muslims remove their shoes before entering a mosque, but the practice at Shaw Wallace does not mean that the computer room has been consecrated a holy of holies. It is simply a further measure to ensure that the atmosphere remains clean and dust-free.

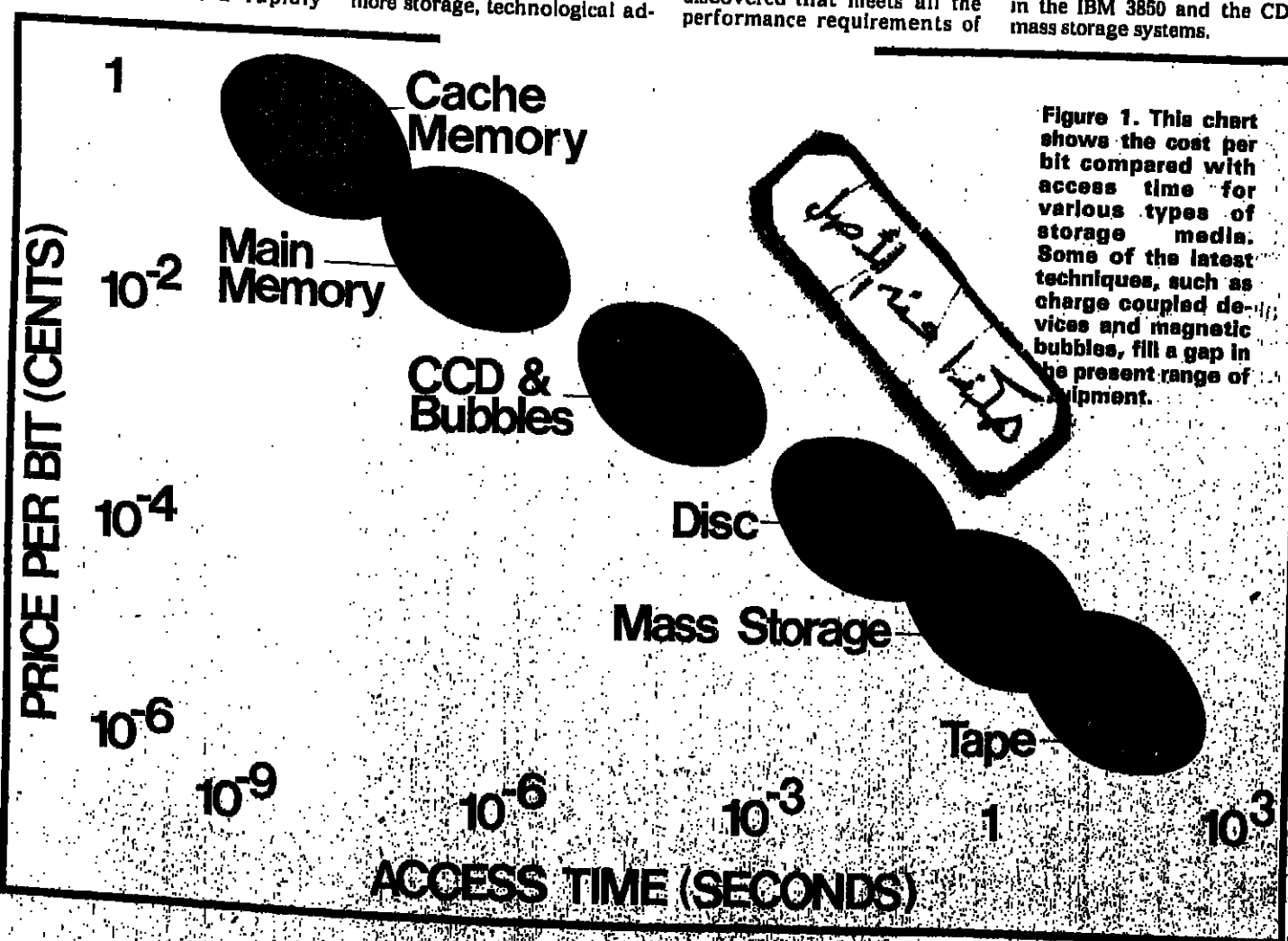


Figure 1. This chart shows the cost per bit compared with access time for various types of storage media. Some of the latest techniques, such as charge coupled devices and magnetic bubbles, fill a gap in the present range of equipment.

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The growing capacity of floppies

By John Moore

THE terms flexible disc, diskette or floppy disc, are some of the more common names for the medium used as the low-cost answer to the need for random access storage for minicomputers and word processors.

The flexible disc is a circular piece of flexible polyester film such as Mylar, eight inches in diameter, coated on both sides with a magnetic iron oxide resembling the coating for magnetic tape. The whole is encased in a plastic or paper outer jacket, which has an inner liner to protect the flexible disc against damage and to act as a surface cleaner.

Contacts in this jacket allow access for the read/write heads, which unlike those for larger non-flexible disc devices, contact the flexible disc surface, usually with a pressure of about 15 grams. A circular cut-out in the centre allows the flexible disc to be rotated at 360 rpm, and further cut-outs allow indexing or sectoring.

The jacket and flexible disc are inserted in the drive as a unit, and the disc rotates within the jacket.

The flexible disc medium was originally developed by IBM in the late 1960s to load diagnostic software for IBM's large disc storage and computer control memories in its System 370 computer family. Later, at least two other companies introduced competitive products for similar purposes.

Then in 1972 IBM introduced its answer to the key-to-disc data preparation systems attacking its punched card market. This, the 3740 family of data entry equipment, rapidly expanded in capabilities and the flexible disc market began in earnest.

Since then the flexible disc has become a popular data storage medium and many companies have developed and marketed systems around it. In 1973 a further significant increase in its potential occurred when Vydec became the first manufacturer to use flexible discs in its word processing system. Word processing systems have increasingly incorporated these devices, widening the market for the flexible discs still further.

As with any new technology, the demand has risen for increased capacity. Originally

flexible discs, although coated on both sides, only used one side for storing data, the index hole being offset to ensure that the envelope could only be inserted one way. By making another offset index hole on the other side, the flexible disc could be used on both sides, thus doubling capacity.

However, this meant physically removing and turning the disc by hand, so the next logical development was the drive with dual read/write heads, allowing both sides to be accessed simultaneously; this system is becoming increasingly popular.

The next development in the search for increased capacity was to double the packing density (bits per inch), by more accurate manufacturing techniques. The first flexible disc with significantly increased capacity was IBM's System 34, introduced to the marketplace in December 1977.

In summary, therefore, flexible discs can be single-sided and single-density; single-sided and double-density; and double-sided and double-density.

All this becomes more bewildering when the various sector types are taken into account. Sectoring of flexible discs can be either "soft" or "hard." Soft sectoring uses only a single index hole on the disc, which signals the start of the track on each revolution. Software locates the actual sectors.

Hard sectoring involves the use of a circle of holes (the number corresponding to the number of sectors required), usually near the centre of the disc, but on some types near the outer edge.

It seems unfortunate that drive manufacturers have produced so many different types of drive, requiring different types of flexible disc, so that there is currently some confusion in the market as to which drive requires which disc.

Because of the variations mentioned above, and some others which are available, it is obviously very important for the purchaser to know exactly which type of flexible disc he requires, and to buy from a supplier where he can obtain sound guidance.

The development of the flexible disc has not been without problems. Because of its magnetic tape-type technology, with the read/write heads in contact with the disc surface, wear was at first a problem. A change from stainless steel to ceramic ferrite heads, together with changes in the disc surface coating, has given flexible discs a much more acceptable life span.

It is interesting to note that



Since floppy discs were first used for diagnostic software in IBM's 370 machines at the end of the last decade, these devices have become standard storage equipment for many applications. Here John Moore, manager of European operations for Nashua Computer Products, looks at the development of the floppy and considers some new areas, such as word processing, where increased capacity with low cost makes them a vital factor in many systems.

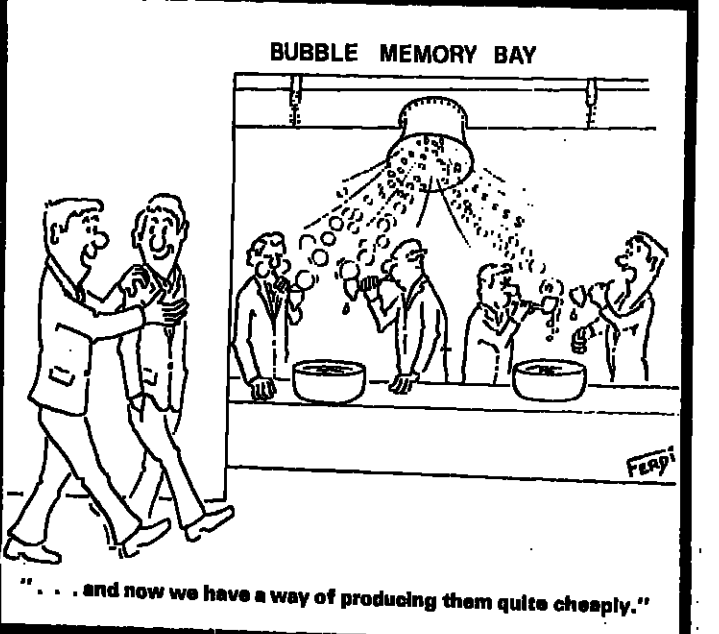
smaller-sized flexible discs. Mini-discs with a diameter of 5.5 inches, and now 2.5 inches, are available, again in various types, with double-density and double-sided mini-discs on the way.

For the future, there are two immediate ways to increase capacity: by doubling the bit density and increasing the track density. A paper presented to ANSI in February 1978 indicates that at least one polyester film manufacturer is ready to announce a dramatic improvement in the thermal and hygroscopic (expansion or shrinkage according to the amount of moisture) values of the substrate it is currently manufacturing.

This could have a significant effect on the flexible disc market, and means that any predictions of the maximum capacity possible per disc could be very inaccurate. In theory there is no limit to capacity.

The original use for the floppy disc, as a diagnostic and data entry medium, is no longer an exciting new development. The excitement now is concerned with the random access capabilities of the floppy and its application as a low-cost storage device (as compared to tape cassettes or cartridges).

At tomorrow's capacities, one standard size, double-sided flexible disc will be capable of storing 3,000 pages of typed reports or data, which is equivalent to a three-drawer file. The combination of a display, keyboard and flexible disc system, with high-speed access to data anywhere in the disc file, is obviously much faster and more accurate than searching through 3,000 pieces of paper.



Cost and speed

From page 17

access times, but will be priced at 25 per cent to 30 per cent of the cost of the equivalent amount of disc storage today.

As I stated earlier, tape will continue to be a viable storage product. Recently announced improvements lead us to believe that tape has the potential for significantly improved data densities. Tape is still the most cost-effective storage medium for large sequential files and for direct access storage device backup, and it will remain so for at least the next several years.

This does not mean that some of the new technologies will not

come into widespread use in the next decade. We believe that they will and considerable effort is being expended on two new technologies in particular, charge-coupled devices (CCD) and magnetic bubbles.

These will fill some of the secondary storage needs mentioned earlier. Charge-coupled devices, we believe, will have widespread application. With the potential of being three to seven times less costly than most random access memory, CCDs are being included in STC product development and will be used by other companies. Bubble technology will follow CCDs into product applications.

Bubbles appear to be more reliable than tape or disc and are non-volatile. However, their inherently slow data rate makes their usefulness in high performance computing and improved moving head disc technology.

For the future, we see revolutionary developments characterizing the data storage industry. The overall design objective will be to provide faster application for the user. We are challenged to provide greater storage capacity and increased reliability, and to keep the cost of storage low.

Amorphous semiconductor materials were considered as nothing more than a scientific curiosity at one time but are now being taken seriously by the office equipment business as the basis for updatable microfilm, by the energy industry as a far cheaper means of converting sunlight into electricity than crystalline materials, and by the computer industry as the vital ingredient in non-volatile memories.

THE ovonic memory switch was announced by S. R. Ovshinsky in 1968, along with a related device, the ovonic threshold switch. The announcement followed, by several years, the invention of the device. This, in turn, was followed by the commercial offering in 1970, by Energy Conversion Devices, of 256-bit arrays of ovonic memory switches constructed on silicon substrates containing isolating diodes.

Since 1970, there has been continual progress in the structure of the ovonic memory device, in its characterisation, in the implementation of compatible metallic contacts, in processes for production and in the attractiveness of the electrical specifications of the device.

Since 1975, Burroughs has been actively involved in furthering the technology through work performed at its Microcircuits Operation in Rancho Bernardo, California.

Early devices were specified as requiring 150 mA of current for dependable writing or re-writing of information into the memory. By 1974, that current requirement had been reduced to 25 mA, opening the way to relatively easy integration into bipolar integrated circuits complete with on-chip write circuitry.

The prospect for significantly lower write current in the future is good, which should ease integration even into MOS circuitry.

Similar significant reductions have been achieved in voltage requirements. Early devices required

Such memories have been under development at Burroughs since 1975 when the company began its close involvement with Energy Conversion Devices of Troy, Michigan, the firm that has pioneered the practical application of amorphous semiconductor materials under the direction of its founder Stanford Ovshinsky. A manufacturing licence agreement signed between ECD and Burroughs earlier this year could lead to the ovonic memory, and it is called, being commercially available in the near future.

The ovonic memory is an electrically alterable device with a very high reading speed. In this article Vernon Bluhm, amorphous devices manager at Burroughs, describes how the device is made and gives its performance characteristics.

material in the conducting regions becomes partially crystalline, and when excitation is removed, the material in that region remains conductive. A memory device in this condition is said to be "set".

The restoration of the memory device to its high resistivity state is called "reset". "Reset" is accomplished by forcing an electric current several times as great as the previous "set" current through the device for a very brief period. The current density will be high, since the extent of the previously established conducting region was determined by the "set" current and is less than the extent of the pore.

The brief, typically 0.5 microsecond, pulse of current used for reset brings about intense heating of the material in the conducting region and restores it to a non-crystalline state. The rapid loss of heat to

the surrounding materials after the end of the pulse results in the material remaining in its non-crystalline, amorphous, form. The device is restored to its high resistance state. Multiple reset pulses are found to be more dependable than single pulses and are normally used.

The non-volatility, all-electric write and rewrite and long life of the ovonic memory switch are very attractive features. The memory structure is compact.

Its dimensions are determined by a minimum pore dimension of approximately 5 microns for devices operating at current levels described here, and by lithographic tolerances. The ovonic memory switch is compatible with silicon integrated circuits and can be incorporated on-chip.

Devices based on the ovonic memory switch appear to have many applications in electronic equipment of the future.

Development of ovonic memory

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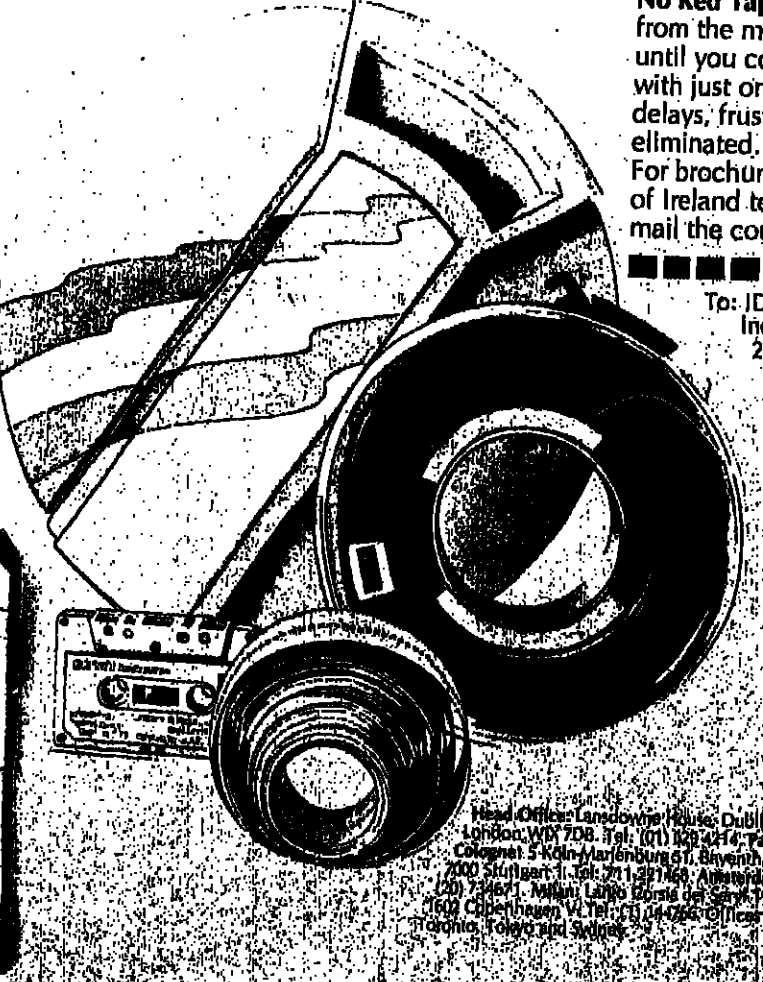
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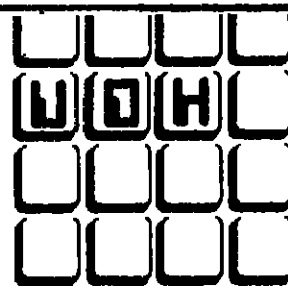
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Applicants should have upwards of 2-3 years' practical design experience in commercial data processing and would be unlikely to have less than five years' experience in all. They should also have a sound educational background, and formal systems training. This post initially is to implement an integrated stock control system.

(2)

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Applications, giving a curriculum vitae and the names of three referees should be sent to D. A. H. Copland, The University, Southampton SO9 5NH, quoting reference 181/A as soon as possible.

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Please apply in writing giving details of qualifications, age and experience and reasons why you consider yourself for the position to:-
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SYSTEMS ANALYSTS

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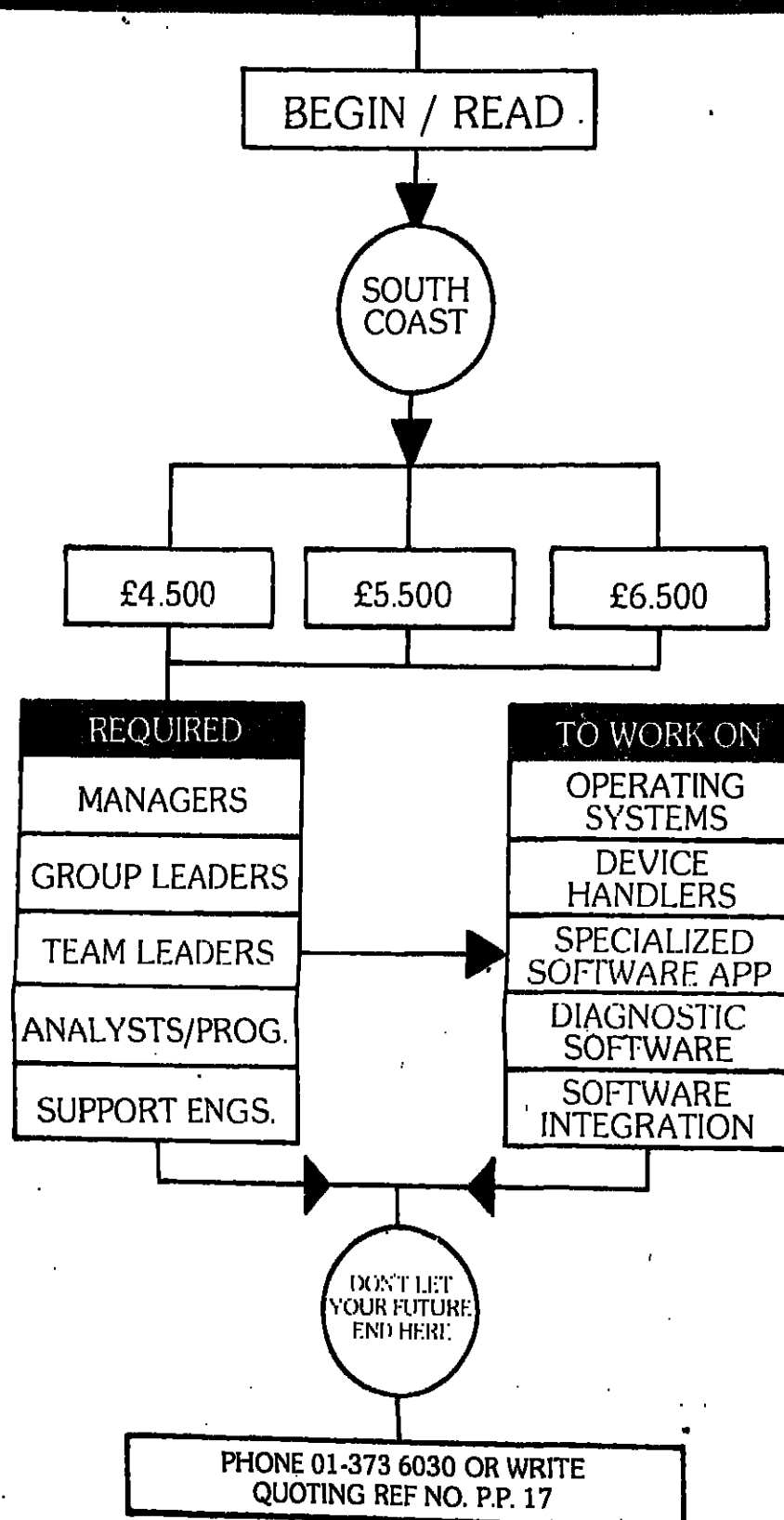
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This system is being developed on a Modular One computer with disc backing store and multiple terminals; the job offers considerable scope for experience in design, programming and implementing a computer system in a vital time environment. The successful applicant will be expected to adopt a disciplined professional approach and must be used to working to time schedules.

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■ Application forms (for return by 28 September 1978) from Civil Service Commission, Alcon Lane, Basingstoke, Hants, RG21 1JB, telephone Basingstoke (0256) 62551 (answering service if office closed).

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Lothian Health Board University of Edinburgh

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Herts.

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Contact: Andy Wright

D.P. Manager

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Contact: Andy Wright

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Up to £6,000

Contact: Jim Baker

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JAMES BAKER ASSOCIATES, International Personnel Consultants
16 Maddox Street, London W.1. Tel: 01-491 4478

Software Design Programmers

Herts.

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Contact: Margaret Stevens

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Contact: Margaret Stevens

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Contact: Jim Baker

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This Position offers a real opportunity to save AND see the world!

We are looking for an ICL Programmer with a minimum of 2 years' COBOL experience (RPG2 and 2903 also helpful). Are you married, or nearly married, with no children and male (Papua New Guinean work permit regulation)?

If you are interested, and fit these requirements please send a DETAILED personal and career history to: Alan Selwood, D.P. Manager at the above address.

Interviews will be held in London at the end of October. The successful applicant should be prepared to be in Papua New Guinea by early January 1979.



COMPUTER TWO THOUSAND
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01-637 3265

OPPORTUNITIES FOR EXCELLENT STAFF
In line with current plans we will be pleased to hear from program-mer, analysts, the following disciplines:
MARK IV FORTRAN COBOL, BASIC PL/1, RPG BAL
and any DATABASE or TP MONITORS
Forthcoming internal projects include developments on in-house equipment. Current external projects are both U.K. wide and overseas-based.
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For further details contact:
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AIRLINE SERVICE ORIENTED INTERNATIONAL COMPANY seeks for its Paris Head Office
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He will carry out marketing studies for new services that we could offer to Airlines to meet their needs in particular concerning Passenger, Freight or Administrative functions which lend themselves to automation. The studies will cover all aspects of any potential service before an in-depth technical study is requested from the Technical Department. The person selected will participate in the analysis of market trends and preparation of the marketing plan. - Marketing experience related to the Air Transport Industry. - University Degree or equivalent. Position based in Paris. Knowledge of French useful but not essential. Some travel abroad essential. Please write giving full career details to:
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Careful planning often makes the difference between the successful and the not so successful computer career. Prescott Computers understand this because we specialise in overseas computer recruitment and the selection for an overseas post requires extra care by Prescott, employer and employee. We use the same principles of care whether U.K. only or overseas employment is involved. We currently wish to interview Programmers, Systems Analysts, Analyst Programmers, Consultants and Sales People for a broad range of clients in England, Australia, New Zealand and South Africa. Salaries range from £4,000 to £12,000 p.a. If you are interested, why not telephone Chad Stolper on (01) 242 2142 for an informal discussion. Alternatively if you prefer write to him at:
Prescot Computers Limited, 6 Bloomsbury Square, London WC1A 2LP
(01) 242 2142 Telex 29110

UNIVERSITY COLLEGE LONDON
A new research project will involve theoretical analysis of network protocols, simulation of and experimentation with several computer networks including EURONET, EPS, ARPANET and SATNET. These facilities available include several PDP 11 computers, access to many networks and on-line use of large remote host computers. Emphasis of the research will be on protocol hierarchy including the X25 Access Protocol.
A SENIOR RESEARCH FELLOW
is required to direct the theoretical aspects of the project. A degree, a strong theoretical background with proven research ability are necessary qualifications. Experience of Computer simulation and/or analysis of computer communication procedures are important. Salary range £8,500-£8,000.
AN ENGINEER/TECHNICIAN
is needed to help maintain the PDP 11 computers and the communication equipment. Duties include design and construction of terminal interface equipment. Salary range £4,000-£6,500.
A RESEARCH ASSISTANT/PROGRAMMER
is needed to participate in the practical aspects of the project. A degree and programming experience, preferably with real-time mini computers are important qualifications. Salary range £4,500-£5,500.
Applications by October 2nd to Professor P. T. Kirstein, Department of Statistics and Computer Science, University College London, Gower Street, London WC1E 6BT.

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COMPUTER PERSONNEL CONSULTANTS LICENCE NO. SE(A)62
C/W 7.9.78

Exciting opportunities for experienced computer people

We are the Quarry Products Division of the Tarmac Group and a market leader in aggregates and derived products throughout the United Kingdom.
Our Group Headquarters will shortly decentralise the Division's computer activities to MATLOCK and WOLVERHAMPTON and these opportunities offer the challenge of joining newly formed departments and contributing to their success.
Both departments will have a new ICL 2904 installation consisting of 96K, 4 FDS 60's, magnetic tape drives and line printers and will operate under GEORGE 2+.

COMPUTER MANAGER - Matlock (Ref. RN/1)
COMPUTER MANAGER - Wolverhampton (Ref. RH/5)
Initially the Manager will assist in the transfer of existing systems from the centralised mainframe computer prior to assuming responsibility for the running, maintenance and development of these systems.
The successful applicants will have a systems and/or programming background and several years' commercial data processing experience.

CHIEF PROGRAMMER - (Ref. RH/6)
Based at Wolverhampton he/she will head a central team in the development of major applications and be responsible for the creation and maintenance of standards.
The successful applicant will have experience in both COBOL and PLAN and a thorough knowledge of disc based systems. A knowledge of GEORGE 2+ will be an advantage.

These posts offer attractive salaries which are negotiable, fringe benefits normally to be associated with an international group and a company car.
To avoid undue delay in arranging interviews for shortlisted male/female candidates, please apply in writing with full personal and career details, quoting reference number, to:
Mrs. D.M. Rowe, Recruitment and Training Officer, Tarmac Roadstone Holdings Limited, Roadstone House, 50, Waterloo Road, Wolverhampton.

Tarmac ROADSTONE

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LBC, Capital Radio, BRMB, Piccadilly, Radio Trent, Radio Clyde, Swansea Sound, Radio Tees... on all these stations, powerful peak-time commercials will be reminding computer people that the computer jobs are here, on Computer Weekly's classified pages. Our classified ads reach some 16,569 systems analysts, 20,443 programmers, and 9,664 operators. From now on, they'll be pulling in still more... at by far the lowest cost-per-thousand rate in the computer press! (12p per single column centimetre per 1,000 readers. The rate of nearest competitor is 16p.).
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COMPUTER WEEKLY

delivered 12/5



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To AU\$16500

ESSENTIAL QUALIFICATIONS:

Minimum 3 years assembler programming with airline ACP based applications experience.

Degree/Diploma in computing or other appropriate qualification.

THE JOB:

Participate as appropriate in system specification, design and programming real time applications.

Assist user department personnel in producing functional specifications and the introduction of new systems.

APPLICATIONS:

Interested persons wishing to pursue their profession in a new environment are invited to apply in writing stating personal details, educational qualifications and career experience to:

Mr R P Watson,
Acting Personnel Superintendent, Europe,
Qantas Regional Headquarters,
500 Chiswick High Road, W45AW

Interviews will be conducted in London from 25/9/78 to 29/9/78. Evening appointments can be arranged if necessary.

Successful applicants will be required to undergo normal immigration processing through the Australian migration authorities.

WILTSHIRE COUNTY COUNCIL
WILTSHIRE COLLEGE
Chippenham Technical College, Dock
Tisbury Road
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Department of General Education

**LECTURER IN
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AND MATHEMATICS**

A graduate qualified teacher is required for 1st September, 1978. To teach the range of subjects up to OCE, A and ONC level. A knowledge of the application of these subjects in business would be an added recommendation.

Applications forms and further particulars available from the Clerk to the Governors, Telephone Chippenham 610501 ext 27, returnable as soon as possible.

31.7.1978/AMH
30th August, 1978

UNIVERSITY OF BRADFORD
Applications are invited for the post of
**TEMPORARY
EXPERIMENTAL
OFFICER**

In Electrical & Electronic Engineering to work on a one year contract as a day employee, during the range 1300-1500hrs. The contract involves extensive data analysis and computing - a sound knowledge of FORTRAN is essential. Good experience of computer graphics would also be an advantage. Applications from suitable persons should be sent to the Director of Studies, before 22 September and must be accompanied by the Employer's Form No. 62/63, C10, University of Bradford, West Yorkshire BD7 1DP.

Are you interested in:

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If so, several positions are available for suitably experienced Assembler Programmers to join our project teams in Sydney and become actively involved in a major program of development for our real-time passenger reservations and airport handling systems.

COMMENCING SALARY: In the range AU\$14500-AU\$16500 according to experience.

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RELOCATION: Realistic assistance provided. Details will be supplied as required.

Opportunities for Programmers

Central Scotland c.£4,500

Our client, a highly successful international company, is heavily committed to the expansion of its computer systems and facilities.

The IBM 370/125 equipment has recently been expanded to include highly sophisticated on-line systems, and future applications include on-line order processing and costing systems.

These career opportunities will be of interest to energetic programmers with at least 18 months experience in BAL or COBOL, under DOS. The successful candidates will be ambitious self-starters who are keen to join a stimulating environment.

Conditions of employment are good and include a realistic salary along with other fringe benefits expected of a large, progressive organisation.

Please write, giving details of career to date, and quoting reference R42263 to:

The Manager,
Confidential Reply Service,
MCS/ROBERTSON & SCOTT,
MCS House, 23 Park Circus, Glasgow, G3 6AS.

All letters will be opened, acknowledged and forwarded to our client. Please list separately any companies to which your application should not be sent.



Data Processing Consultants

£6,000 - £10,000

London/Manchester

BIS Applied Systems Limited is a member of the Business Intelligence Services Group which employs more than 300 staff in data processing consultancy, systems development, data processing education and market research. The Group has provided DP services for 14 years, and has annual revenue running at a rate in excess of £5 millions.

BIS Applied Systems Limited is a company specialising in DP consultancy and DP education. With its broad client base including 31 of the top 60 companies it covers all industry classifications. To enable us to continue our successful growth rate we require consultants to work on a wide range of assignments.

As a member of our consultancy team you would be involved with projects such as:

- ☐ Long term system and DP strategy planning
- ☐ Data base design
- ☐ Real time and communications networks design
- ☐ Evaluation of mini computers and distributed intelligence systems
- ☐ Structured design and programming
- ☐ Design and introduction of DP management control systems
- ☐ Hardware and software selection
- ☐ Systems implementation
- ☐ DP training

Career prospects are excellent within this expanding company and opportunities exist to work within a variety of computer installations. Candidates must have demonstrated the ability to achieve results in their career to date and should be good communicators.

BIS Applied Systems staff receive benefits including:

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Assistance towards relocation can be provided.

If you are interested and can demonstrate technical, project oriented or management achievement in your DP career to date, why not telephone or write for further details to: Margaret Talbot (London) or Gerry Richings (Manchester) at the addresses below, quoting reference R4225.

BIS Applied Systems Limited,
York House, 130 Westminster Bridge Road,
London SE1 7UT.
Telephone 01-633 0866

BIS Applied Systems Limited,
Quay House,
Quay Street, Manchester.
Telephone 061-831 7031



Wrangler

COMPUTER OPERATOR

Due to internal promotion, Blue Bell Apparel Limited, manufacturers of Wrangler Leisure Wear have a vacancy for a computer operator.

We are looking for someone who has an interest in programming and one/two years' experience of the IBM System 3 or similar commercial computer. You will become part of a small and friendly team; will be subjected to frequent pressure and be expected to work without supervision. We currently operate a two shift system - day and evenings.

Remuneration and other terms of employment are commensurate with those of a large rapidly expanding international company.

Applications to: Mr Alan Osborn, Personnel Manager, Blue Bell Apparel Ltd., Colverton, Nottingham.

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CRC Information Systems Ltd, at Slough has an expanding 1100, configuration including 14x8434, 5x8430, 5xU16. Operating in a TIP/DMS environment hosting a comms network.

To strengthen the current team experienced top grade staff are required for the post(s) of:

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Salary at £4,600/£5,200 including s.a.

If you can organise and train staff and implement methods of documentation and control, prospects of further promotion are good.

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750 Deal Way, Slough SL1 4SH
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MYRIAD APPOINTMENTS LIMITED

Computer Personnel Consultants

SENIOR SYSTEMS ANALYSTS

KENT

to £8500

A senior systems analyst with sound experience in commercial systems design and project control is required to augment an active team in Kent.

It is essential for candidates to show proven ability in scheduling and controlling a team working to good standards supported by comprehensive documentation. A background in programming would be an added advantage.

The successful applicant will be involved in unusual and interesting applications and will have the personality to establish good working relationships with user department personnel at both junior and senior level.

Conditions of employment are excellent, salary is negotiable dependent on experience. A comprehensive relocation package is available where necessary.

Ref E1/0709

PRODUCTION MANAGER

S. LONDON

Non-shift

c £5000

This is an excellent opportunity for someone, currently engaged in either computer operations or data control, who is seeking wider experience and promotion into a managerial capacity.

The successful applicant will manage three teams (data preparation, data control and operations) and ensure the smooth flow of production work through a busy data centre. A solid computer background and a strong personality will be needed, since he/she will provide the initial user interface, advise on additional terminal equipment (minis are under consideration) and organise for the expansion of the department and the setting up of a fourth team.

The Company is one of the most successful service organisations in Europe with users being served by a network linking major cities in the U.K. and the Continent.

Ref. N2/0709

CHUBB ELECTRONICS

IF YOU HAVE SECURITY IN MIND, THERE'S A FUTURE WITH CHUBB

Chubb Electronics was formed by the grouping of four highly specialised companies - Chubb Alarms, Chubb Integrated Systems, I.C.C. Machines and Cross Cash Registers. As a result, Chubb can offer some of the most advanced and effective electronic security and cash handling systems in the world today. Chubb rely on top calibre personnel and with the mood of expansion in the air, we are able to offer more opportunities combining challenge, security and career development.

At CHUBB ALARMS we specialise in integrated security and building control systems and we are currently looking for more people to strengthen our young professional team working in a commercial environment.

PROJECT EXECUTIVE

The role is to assist in commercial negotiations for integrated security systems and to project manage system implementation for which you will need some experience of systems engineering or project management, together with an HNC in electronics, as a minimum.

PROJECT SPECIALIST - COMMISSIONING

The requirement is for an experienced engineer to undertake commissioning of hardware/software for computer and microprocessor based security and control systems. A good practical background together with a degree, HNC in electrical/electronic engineering or equivalent is sought for this appointment which also involves considerable site work in both the U.K. and overseas.

SOFTWARE SYSTEMS ENGINEER

This position, in our services section, will interest a young, enthusiastic person where the opportunity is provided for involvement on a wide variety of system projects. The responsibilities revolve around system assembly, programming and test for a wide range of computer and microprocessor control systems, requiring some practical experience of assembler programming. Further training will be provided where necessary.

PROJECT ENGINEER

Working as an integral part of the project team for integrated security systems, your job will involve system specification, preparation of tenders and assisting in the implementation of multifunctional systems. The successful candidate should hold a technical qualification preferably at HNC level and be capable of quickly understanding complex systems.

DRAFTSMAN

We have in mind an experienced person who is used to working on their own initiative, to provide installation and systems drawings and support to project teams and engineering staff. Some commercial art experience, although not essential, would be an advantage.

GRADUATE TRAINEE

Our need is for a recently qualified engineering graduate, with an electronics or computer science bias, to work with our team on integrated security, fire and environmental control systems. Training in systems engineering, project management and commercial services will be given.

These appointments are open to both male and female applicants. The salaries reflect the importance of the positions and in addition some appointments carry the benefit of a company car. Promotional prospects within the Group are extremely good.

To apply write with full details of experience to: MARILYN DAVIDSON, COMBYTE SERVICES LTD., Suite 74-76, Henrietta Street, London, WC2E 8LH.

POTENTIAL ANALYSTS SALES SUPPORT

Near CROYDON

To £6000

This is an excellent opportunity for experienced COBOL programmers to progress to Analysis and play an active part in the development of systems from feasibility to implementation.

The successful candidates will have the opportunity of gaining client liaison experience and the range of activities will extend to both pre- and post-sales situations. The more senior positions will give opportunities for project leadership.

The Company operate a large D.P. Centre and have a full development programme which will afford experience in three Database systems. Excellent commencing salaries will be offered and are enhanced by first-class conditions of employment including 4 weeks' holiday, restaurant and social club.

Ref. N1/0709

ANALYST/PROGRAMMER

N. LONDON

New Systems

To £6500

This is an excellent opportunity for an experienced Analyst/Programmer who now wishes to hold responsibility for the development of an interesting variety of new systems.

The successful candidate will be involved with feasibility studies and play a predominant role with the development of new systems through all stages of implementation.

Candidates should have several years' COBOL Programming experience gained on any machine. An IBM background would be a distinct advantage.

The Company provides first-class conditions of employment and is planning a major upgrade in hardware to cope with a number of on-line systems throughout its UK and European outlets.

Ref. N3/0709

24-hour answering service

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£3800 to £4750
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For the senior position we need someone fully conversant in DOS/VS and POWER/VS and who can actively supervise other personnel including a small punch room and perform scheduling and data control functions.

Ideally, the junior position will be filled by a younger person with about one year's experience of DOS/VS or in fact a trainee capable of expressing potential for the future.

In return for the skills we need we can offer the right men or women an interesting future in a good local job with genuine career development prospects. The attractive salaries are complemented by a range of benefits including a productivity scheme, 4 weeks holiday, holiday bonus and subsidised canteen.

Contact P. Chatterton our D.P. Manager at
Fishburn Printing Ink Co. Ltd., 94 St Albans Road,
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"The West Country offers so much more"

Enjoy the towns and countryside you visited on holiday all year round while furthering your D.P. career in one of the many expanding and progressive installations in the West Country.



We are currently interested in experienced Programmers and Analysts with a sound commercial or technical background. Salaries range from £3.7K-£8K + dependent on experience and many companies now offer help with relocation.

If you are interested in a move Westwards and would like to discuss your career prospects with someone who knows the companies and the area, please contact:
WALKER-WESTON ASSOCIATES LIMITED
WOODLANDS, LOWER BRISTOL ROAD, BATH, AVON BA2 8ES
Telephone: BATH 217880 (4 lines)

MYRIAD MANAGEMENT CONSULTANCY SYSTEMS AND PROGRAMMING BACKGROUND

c £9,000

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Formed in mid '74 Myriad has doubled both turnover and size each year and provides a friendly professional environment in an attractive location in Central London. An excellent salary package is offered together with good conditions of employment.

Ref: M1/0709

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants
Telephone or write to:- 30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

PAPWORTH INDUSTRIES DATA PROCESSING MANAGER

Nr. Cambridge

c. £6000

Papworth is a settlement dedicated to the rehabilitation and employment of handicapped persons. It is located in a rural setting, 10 miles from Cambridge and within easy access of the main A1 and A45 trunk routes.

We require an experienced computer professional to take complete control of our ICL 2903 site. This will involve consolidating current in-house systems and expertise plus future development of the installation to take on bureau facilities.

If you have experience of...

ICL Equipment
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We can offer:-

Scope for initiative
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Excellent career progression
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Apply, in confidence, giving details of age and experience, to:-

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CAMBRIDGE CB3 8RG

Operations opportunities in the Lake District

Operations Team Leader (inc. from £6000)
Computer Operator (inc. from £4940)

We are looking for two experienced men or women to join our Operations Department in Penrith, Cumbria, where we operate a 2mb 2880 under GEOS DME. It will run under VME/B at some future date and provide, over two shifts, a service to users in various parts of the country via a large communications network.

Because of our Lake District location we are highly self-sufficient and are therefore only interested in hearing from people who can make an immediate contribution to the successful running of the installation.

Applicants should have a minimum of two years GEOS experience for the Operator position and also Shift Leader experience for the OTL position.

We offer:-

- * bonus schemes in addition to basic salaries
- * genuine career opportunities
- * employment in a custom-built Computer Centre
- * progressive training on 2800 equipment
- * above mentioned minimum salaries, inclusive of shift allowance and 40 hour week allowance
- * usual benefits associated with a large multi-national company

Relocation expenses will be provided where necessary.

Contact: Mr. J. C. Hodgson, Regional Controller
BICC Limited, Regional Computer Centre
Gillivilly Industrial Estate
Penrith, Cumbria.
Telephone: Penrith 6801

BICC

COBOL Programmers for the development of advanced business systems £5,000-£7,000

Business information systems in Shell's Central Offices are big, interesting and demanding. They are important in many aspects of our world-wide oil trading, chemicals, natural gas, marine, group information and accounting, and other business activities. They grow and change as rapidly as our industry; in consequence we are looking for high calibre programmers. They will have an important and responsible role in the development and support of new systems in Shell. By their nature, these systems require the use of advanced techniques, such as data base and on-line programming in an IBM VS environment.

Initially the new programmers will work at Shell Centre in London, where they will join relatively small and technically self-sufficient groups, organised mainly on a user and project basis. However, interesting assignments arise overseas and elsewhere in the U.K. for which they could be considered. Opportunities also exist for work involving programmer supervision and systems design together with progression to business analysis for those people showing the necessary initiative and skills.

We invite applications from programmers who have at least two years' practical experience of COBOL. The starting salary will be in the range £5,000 to £7,000 per annum, including London Allowance. We offer first class conditions, including an excellent pension scheme, varied sports and social amenities and other benefits. Where appropriate, assistance will be given with relocation expenses. Please write or telephone for an application form to:

Shell International Petroleum Company Limited, Recruitment Division
(C12) PNEL/21, Shell Centre, London SE1 7NA. Telephone: 01-934 2495.



NORTHERN RECRUITMENT FEATURE

Advertisers are reminded that the next Computer Weekly area feature will be published on September 28 and will highlight career opportunities in the North.

Space reservations should be made as soon as possible to:

Owen Kelly — Manchester — 061-872 4211
Eddie Farrell — London — 01-261 8097

Copy Deadline: PM Friday before

COMPUTER WEEKLY
THE INDUSTRY'S WIDEST READ AND MOST REQUESTED NEWSPAPER

SENIOR PROGRAMMER

Salary range c. £5,500-£6,000 p.a.

A centralised signalling control system is currently being implemented on a dual GEC 4080 installation for the Northern and Victoria Lines. We need a Senior Programmer to work as a member of the implementation project team producing the application software.

Experience in real-time systems is essential, but applicants must also be able to demonstrate at least three years' proven practical experience in programming in both high level and assembler type languages. An appreciation of systems analysis and design techniques is very desirable. A qualification leading to membership of a recognised appropriate institution or Society is also desirable.

If you are interested in this opportunity write to Staff Appointments and Development Officer (Ref. 324/C) London Transport, 85 Broadway SW1H 0BD, or Phone 01-222 5000, ext. 523.



ENGINEERING CONCESSIONAIRES LTD.

ANALYST/ PROGRAMMER D.P.M. DESIGNATE INITIAL SALARY C.£5,000

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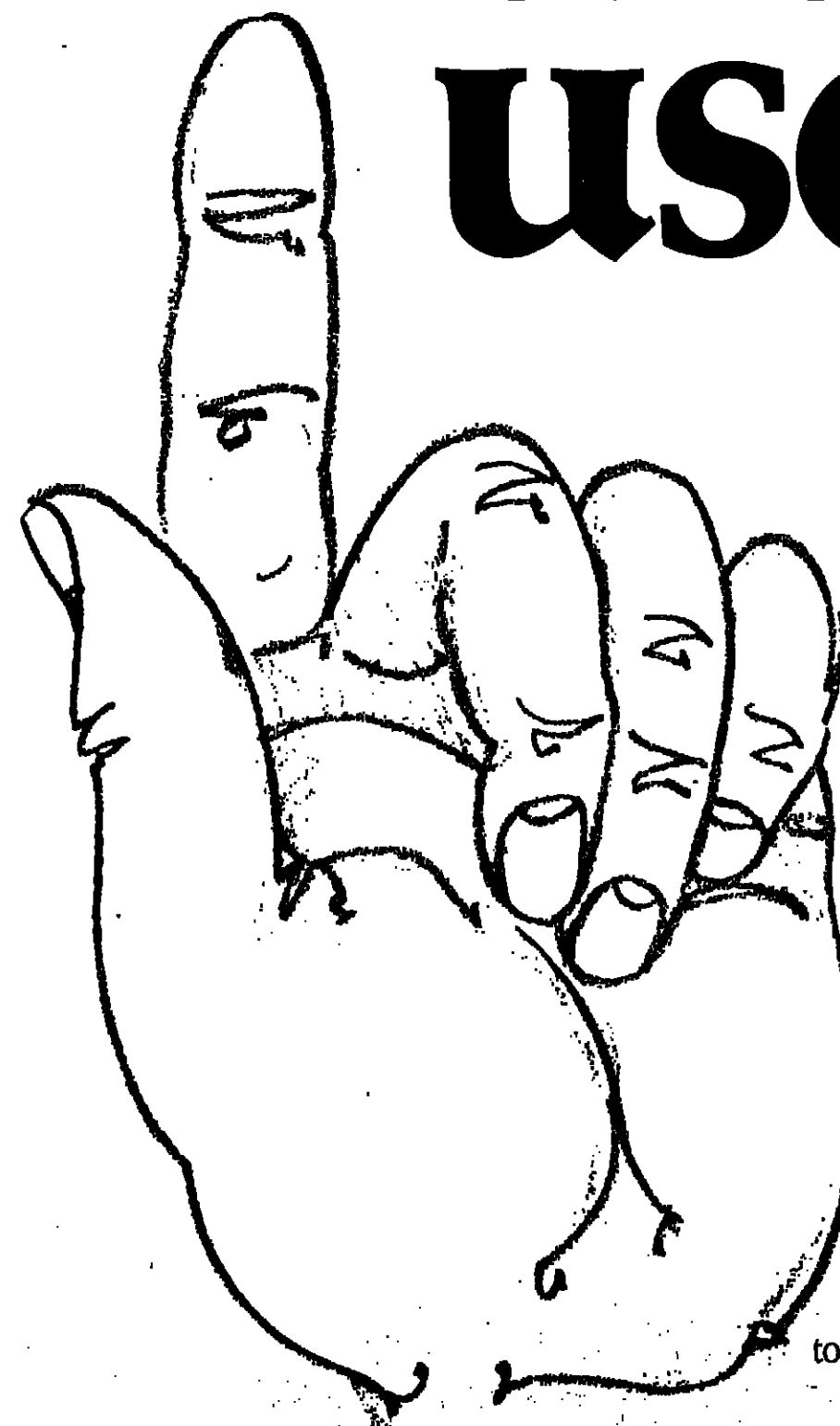
Preference will be given to applicants possessing relevant IBM experience, although a sound knowledge of analytical techniques, coupled with a good understanding of RPG is more important.

As part of a large group of companies we are in a position to offer genuine career prospects, therefore the successful applicant can expect plenty of freedom to develop his/her own talent.

Re-location expenses will be taken into consideration.

Please send applications, in writing, to:
The Accountant, Engineering Concessionaires Ltd.,
140 Avenue, Sandhurst, Deeside, Clwyd CH8 2AP

Find out... use your index



Here's something for you to mull over.

We're a leading petrochemical contracting company making varied and extensive use of computers. Our Programmers and Analyst/Programmers get invaluable experience on stimulating and demanding assignments. And quite simply we'd like you to phone us on the dates mentioned below to find out more and to arrange an early interview.

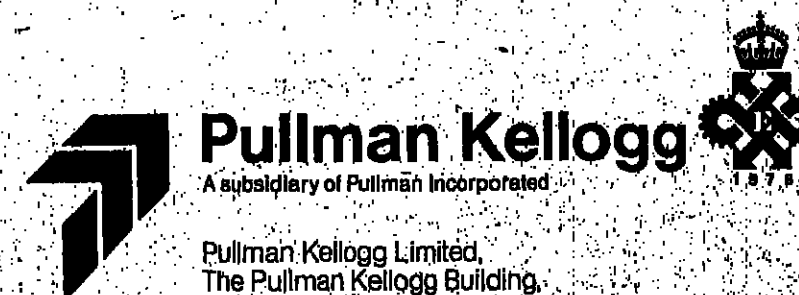
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Competitive salaries will be offered to the right applicants with relocation expenses where appropriate. If you would like to discuss these opportunities telephone:- Peter Griffiths, Systems Manager ext. 6826, Tom Wilson, Programming Manager ext. 6846 or write giving full career details to Bobbie Buchanan, Computer Group Personnel Officer, CWS Limited, P.O. Box 53, New Century House, Manchester M60 4ES. Tel: 061-834 1212.



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Manchester 2 x ICL 1904S
(shortly to be enhanced
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Liverpool ICL 8959

Computer Operations Manager

West London c. £8500 + Car

Our client is the UK subsidiary of one of the world's largest chemical and pharmaceutical companies. Their UK headquarters are in Hounslow, close to London airport where their mainframe computer complex is based, providing their UK operations with sophisticated data processing facilities using interconnecting teleprocessing links.

The service is provided by a 1 megabyte IBM 370/148, operating under OS VSI using CICS and IMS DB, with 3333 disks and 3420 tapes. At the present time the computer is operating on a three shift 24 hours per day basis. To manage and develop these data processing facilities the company now needs to appoint a Computer Operations Manager.

The successful applicant will be responsible for the day to day running of the computer centre and its staff of 30 which includes the operating, data preparation and production control personnel and a hardware specialist. He/she will also be responsible for the control, budgeting, security, planning and staffing of the centre together with participation in the evaluation of future hardware requirements and their effective implementation.

Suitable candidates will possess in excess of five years operations experience on IBM 370 equipment, the last three years being in operations management. Ideally the candidate will be at least 28 with a solid academic record. A good personality, management and leadership skills with the ability to motivate others coupled with a sound knowledge of IBM 370 on-line systems under OS using database techniques are essential.

This is a senior management appointment and requires strong technical and personal qualities; it is a rewarding and challenging role, offering a substantial range of fringe benefits including:-

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min. 3 months
3 months
min. 3 months
3 months
3 months
3-6 months

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1800 COBOL + Comma. Mgr.
1800 Plan + COBOL
2803 COBOL
1800 COBOL

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Worcester
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8-12 months
init. 2 months
3 months
6 months
3 months
6 months
Various

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Singer 1500 Assembler
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DEC DIBOL
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London
North East
North East
North West
Iran
Various

min. 3 months
4 months
min. 3 months
6 months
6 months
6 months
min. 3 months

Contacts: North: Ron Vipond - John Christian
South: Sara Smith

Evenings & Weekends

Ron: 061-904 0168
John: 061-904 0168
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Computer Operations - Shift Leader

up to £4600 + shift allowance

to supervise and co-ordinate a Senior Operator and 4 shift operators working on ICL 1904S and 2970 computers.

Applicants must be educated to at least 'A' level standard and have 5 years' plus operating experience on a third generation computer, including some experience of the ICL 2900 machine.

Starting salary will be up to £4600 plus shift allowance, but more could be paid to candidates with

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Excellent employment conditions include a non-contributory pension, canteen service, extensive sports and social facilities and assistance with relocation where appropriate.

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A growing firm of building and civil engineering contractors requires a Fortran programmer to join an established team concerned with writing, developing and maintaining computer programs for a variety of engineering applications.

In house computer facilities, including mini-computers with associated plotting and graphics display peripherals, are at the disposal of the program development team.

The successful applicant should have experience in writing FORTTRAN programs, preferably using mini-computers, together with the ability to work efficiently with a minimum of supervision.

The appointment, which is based in London offers the usual advantages expected from a large organisation and is open to men and women.

Replies to Box No. 1980, Computer Weekly, Room 119, Dorset House, Stamford Street, London SE1 9LU.

METROPOLITAN BOROUGH OF Rochdale

Treasurer's Department (Computer Section)

SENIOR PROGRAMMER

80.1 £5,232-£5,588

Rochdale is situated 11 miles north of Manchester on the edge of open moorland.

The Council has ordered an ICL 2980 system for delivery in September, 1978. The machine and staff will be housed in purpose-designed accommodation in new municipal offices. The present installation comprises an ICL 64K 1902T with tapes, discs and communication equipment.

The successful candidate will lead a team of five programmers in continuing development and maintenance work and the preparation of existing work for the 2980 installation. Knowledge of 1800 COBOL, Plan and communications systems will be an added advantage.

Assistance with removal expenses and housing accommodation will be given in appropriate cases. Further details may be obtained by ringing Rochdale 47474; Ext. 722, Mr. Wright.

Application form available (by quoting Ref. No. 8.811) from the Principal Personnel Officer, 18 Drake Street, Rochdale OL18 1XG, to whom it should be returned by 21st September, 1978.

DP Manager

Croydon, £8,000 + car

The holding company of a profitable group engaged in chemical, pharmaceutical and mineral manufacturing, processing and distribution requires a manager to assume full responsibility for its ICL System 10 installation. Previous DP management experience is not essential but candidates should be seasoned professionals.

aged 28 plus, and will have had responsibility for the design and implementation of commercial applications. They must also be capable of advising on the development of DP facilities throughout the group. This is a key position offering a competitive salary and benefits plus excellent career prospects.

E. Sutton, Ref. 17027/CW.

Male or female candidates should telephone in confidence for a Personal History Form to: LONDON: 01-734 6852, Sutherland House, 516 Argyll Street, W1E 6EZ.

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City	Analyst - Lga. Commercial Sys.	£ 6K
Surrey	Analyst Programmer - COBOL	£ 5.8K
Wilts	Analyst - Insurance Exp.	£ Neg.
City	Snr. Programmer - PL/1	to £7K

We always have a number of clients with vacancies for programmers and analysts of all disciplines, so if you're looking for a change:-

CONTACT Marilyn Davidson - NOW

Agency Licence Number SE/A/2648



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ENEG
£3K
£3.4K

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2/3 yrs. - H.P. - COBOL or Basic, Asst.
1 yr. IBM or ICL 2903 + RPG/COBOL
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PDP 11 - RSTS - RSX/11M
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W./Ches.
M/CR
M/CR
ENEG
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£5K
£6K + Car
ENEG

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Full experience in some of the following: BAL, DOS/VS, TP Monitor or Data
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A fully experienced individual capable of dealing with all the responsibilities
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running CICS, DOS/VS with BRASP, upgrading to 3031 MVS. London.
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Highly skilled person with excellent knowledge of DOS/POWER/CICS,
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Applicants must have at least five years' mini-computer
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Candidates must have had at least 4 years'
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using OS/VS/1 with 2 years at Senior Operator
level. An in-depth knowledge of JCL and IBM
utilities is essential; you should also have had
experience of controlling an IMS tp network and be
familiar with master terminal operator procedures.

Post 2
Leading Operators (2 posts)
Inclusive salary range
£4722-£5802 p.a.

Candidates should be experienced Operators or
Senior Operators with at least 3 years' experience
on large IBM mainframe equipment using
OS/VS/1 (or comparable operating system).
Knowledge of JCL and IBM utilities is essential and
some experience of large tp environments is
desirable.

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Shift Control Clerks (2 posts)
Inclusive salary range
**£4722-£5219 p.a. with pos-
sible progression after 6
months to salary range**
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Candidates must have had a minimum of 3 years'
computing experience, at least one of which in a
control environment, plus a sound working
knowledge of JCL.

For further information or to make an interview
appointment contact:
Peter Anthony on 01-368 6611, EXT. 266, FOR
POST NUMBERS 1 and 2.
Norman Bennett on 01-368 6611, EXT. 263, FOR
POST NUMBER 3.
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LOLA

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We are seeking the above staff to work on systems for advanced
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Applicants should have at least 18 months' COBOL programming
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CS staff enjoy a wide range of facilities provided by the position on the
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The University Administration
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A Programmer is required to
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Applicants should preferably
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The post is tenable for a period
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Applications, giving full de-
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ance of this advertisement.

M.R.C. CLINICAL RESEARCH CENTRE (Haverhill Park Hospital) Westfield Road, Harrow, Middx HA1 3UJ

APPOINTMENT OF HEAD OF DIVISION OF COMPUTING AND STATISTICS

The Medical Research Council invites applications for the post of head of the division of computing and statistics at the Clinical Research Centre, Harrow, Middx.

The person appointed will be required to direct the division's research programme, to maintain a computing and statistical service for the Clinical Research Centre, and to maintain a close liaison with the Harrow Park Hospital Computing Service. The future research programme will be a major factor in the selection of the successful candidate and the director of the centre taking into account the particular interests of the candidates and the needs of the centre.

Candidates should be of high academic standing and with proven ability in managing a research unit.

The salary will be within the range for the senior appointments grade which is equivalent to the universities' professional scale.

Further information about the appointment may be obtained from the Director, Clinical Research Centre, Westfield Road, Harrow, Middx, HA1 3UJ, Tel. 081 873 1407/1408. The final date for the receipt of applications is 2.11.81.

Project Leader

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The successful candidate will manage a team of system analysts and programmers in the day to day maintenance and production of new suites of programs to installation standards. Four years' experience of programming and systems analysis, two in a senior role, are a minimum requirement. Knowledge of Informatica Mark IV and IBM's Basic Assembler Language would be an advantage, although more weight will be given to evidence of leadership and organising ability.

Project Leader
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Applicants should have around 4 years computer experience and a genuine interest in helping hospital staff obtain the best from their extensive computing services.

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PROGRAMMER/ANALYST

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This is an opportunity to be involved in enhancing the present successful commercial systems in an expanding Company with modern equipment.

Salary negotiable to £5,000. Apply with full details of education and experience to
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The Business Analyst will hold responsibility for various assignments within production divisions and will supervise the relevant applications development personnel using the computer installation's new ICL 2960 hardware.

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PL1 Burton-on-Trent, Chatham, City, Croydon, Guildford, Harmondsworth, Horley.

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SALARY Approx: £5,300 to £5,650 including all Supplements and Shift allowances

The Council operates an ICL 2903 computer with F80s and a 7502 based communications network providing a computer service throughout the authority.

The installation is operational between 7.30 am to 7 pm by means of two shifts, i.e. 7.30 am to 4 pm and 10.30 am to 7 pm.

The machine is due to be upgraded to 2904 in late summer and the Council wishes to appoint one experienced RPG11 Programmer wishing to gain experience in the Analyst sphere. The person appointed will have at least eighteen months experience of RPG11, and a sound knowledge of ICL 1900 to 2903 Software/Utilities will be regarded as equally important.

If you would like to discuss any aspect before submitting an application form, please contact: D. BENFIELD, Computer Manager on Trowbridge (02214) 63111 ex. 121.

The West Wiltshire District Council area is situated in a pleasant rural location with easy access to the towns of BATH/BRISTOL and the M4/M5 motorways with reasonable house prices. Removal and lodging expenses can be provided in appropriate cases.

Application forms are available from Personnel Officer WEST WILTSHIRE DISTRICT COUNCIL, BRADLEY ROAD, TROWBRIDGE, WILTSHIRE BA14 0RD or by telephone Trowbridge (02214) 63111 ex. 119 (Mrs. Tilly). Closing date 18th July 1978.

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Applications and further details obtainable from:

The County Surveyor, Guild House, Cross Street, Preston, P1 6DD (Preston 54733, Ext. 204), to whom they should be returned by the 15th September, 1978. Please quote Reference 477.

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Applicants for these vacancies should have at least two years relevant experience. This is a brand-new venture and members of the

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REUTERS,
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London EC4A 4AJ.
Telephone 01-353 7329.

(This is a 24 hour answering service).

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A Computer Programmer is required in the optics section of the Blackett Laboratory. The successful candidate will be associated with a theoretical research group working in laser physics and his principal task will be to design and operate Fortran programs on the College's CDC 6400/6500 computer facility. Applicants should hold an Honours Degree in Mathematics, Physics or Computer Science. Previous experience in Fortran programming would be an advantage. The appointment will be for two years and the salary will be at an appropriate point on the B1 Scale starting at £3084 (under review), including London Allowance, plus USS.

Applications, together with at least two references, to Dr. B. H. C. New, Department of Physics, Imperial College, London SW7 2AZ, to arrive before October 2nd, 1978. Interviews will commence as soon thereafter as possible.

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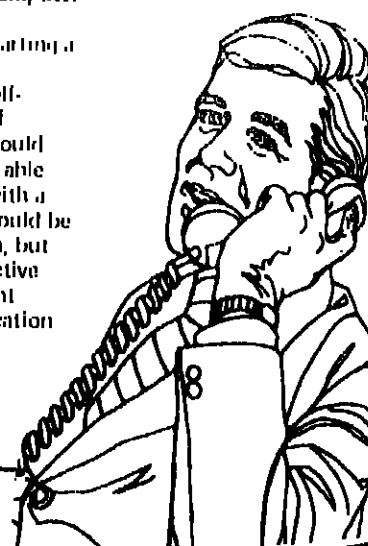
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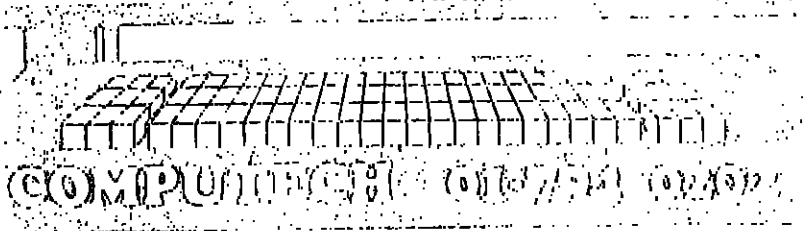
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Netherlands: DOS/VS with PL-1 Programmers.
Netherlands: IMS DB/DC under OS — Applications & Systems Programmers.
Switzerland: IMS DB/DC Systems Programmers.

Switzerland: IMS DB/DC Analyst/Programmers.
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Germany: Univac 110 with FORTRAN.
Bulgaria: Univac 110 DBMS.
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Systems Analyst LONDON Highly reputed firm of Merchant Bankers with world wide business interests are seeking systems analyst with either financial or insurance experience to work as a key figure within their DP. services division. Ideal applicant should have worked in an IBM installation but any other hardware experience will be considered. ★ Excellent working environment ★ Job security ★ Full banking benefits include subsidised mortgage and personal loans ★ Salary £7,500 REF 1694	PROGRAMMERS SOUTH COAST Major expanding British Company seeks COBOL programmers, with minimum 2 years' experience. Retaining large IBM 370 and 3031, they are currently developing DL/I database and CICS and have on-going training and development programme financed with substantial budget. Co can offer: ★ Pretty, coastal location ★ Good training and excellent scope to move into systems ★ FULL RELOCATION expenses ★ Mortgage assistance, non-contrib. pension, subsidised restaurant, free life assurance, etc. ★ Salary to £8,500 REF 1732	Analyst Programmer CITY Established Merchant Bank has opportunity for person with COBOL and PL/I experience to work primarily as a programmer but also be involved with analysis. This position is in the "investment" area but the company will consider any good commercial background. DL/I database is currently being developed, for which FULL TRAINING will be given. ★ Large budget allocated for training purposes ★ Variety of new development including Database ★ First-rate opportunity to follow an excellent career path ★ CHEAP MORTGAGE and insurance, low interest loans, season ticket scheme and excellent sports/social club. ★ Salary £8,000 REF 1711
Mini Programmers LONDON/HOME COUNTIES Prestige company operating on a global scale are recruiting persons with 1-3 years' experience on ANY MINI ASSEMBLER to work in their new modern City offices. Having large DEC PDP11 equipment and expanding at a rapid rate, they have a wide range of on-going projects both in hardware and software areas. ★ Extensive training in up-to-date technology ★ Excellent career opportunities ★ Training in RSXII, RTII and TSTS ★ Opportunity for future travel ★ Salary £6,500 NEG REF 1714	ICL Programmers LONDON Due to development of their advanced computer systems, successful D.P. services department seeks to boost its programming team. Retaining large ICL 1900 equipment they offer excellent opportunities for persons with minimum 2 years' ICL COBOL & PLAN experience. ★ Training on IMS Database ★ Development to analysis ★ Opportunities to join at senior level ★ Applications in various areas providing an absorbing and interesting career ★ Excellent perks include flexi hours and 6 WEEKS HOLIDAY. ★ Salary £5,500 REF 1549	Programmer HOLLAND International company manufacturing sophisticated technical products for world-wide distribution seeks programmer for exciting newly-created position. Company have recently installed PDP11 using BASIC + and consequently require person with good knowledge of the same, with good personality and strong desire to accept a challenge ★ Prestige company with good American backing ★ Good deal of development working using integrated database ★ Excellent prospects and early salary review ★ Salary c £11,000 NEG REF 1742

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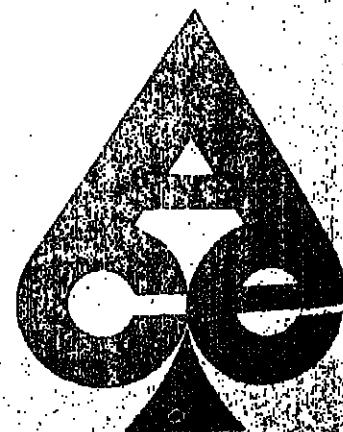
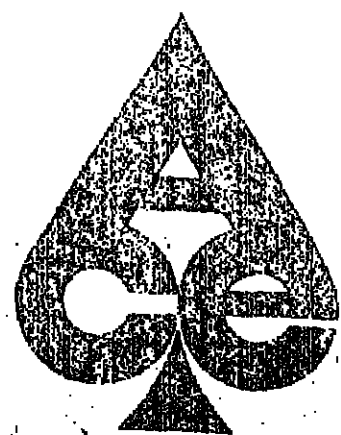
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Telephone me, Bill Seymour, for further details; interviews with our client will take place in London at the end of September.

Bill Seymour 01-580 3754

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Accord Computer Efficiency



IBM 370/148

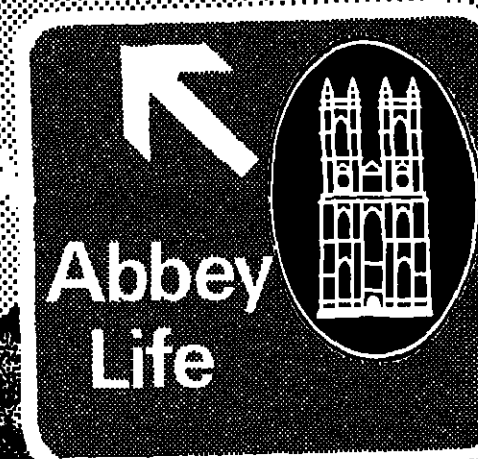
Computer Systems
Analysts &
Designers 5-7K

Computer
Programmers 4-6.5K

Computer Shift
Supervisor 4.5-5.5K
(including Shift Allowances)

Software Systems
Programmers 5-7K

Business Systems
Analysts 4.5-6.5K



Abbey Life's planned expansion is ambitious. We have a strategic plan looking into the next 5 years which include Data Base developments, CICS, DL/I. An IBM 3031 is on order for early 1980. At present we operate a 1 megabyte 370/148 under OS/VS1 on a 3-shift 5-day week basis, and our applications cover a wide range of life assurance, accountancy and information systems. Our prime programming language is COBOL supported by Assembler and Fortran, we use DATAMANAGER and TESTMANAGER for development work.

Salaries are competitive and there is a substantial package of additional benefits.

These include a Subsidised mortgage scheme, Assistance with relocation, Non-contributory pension scheme, Free Life assurance, Subsidised restaurant, Staff discount shop. The Company operates flex time, has first class working conditions in a modern environment, and an active sports and social club.

Interviews will be held in Bournemouth or London. For further details about data processing in Abbey Life and to obtain an application form:-

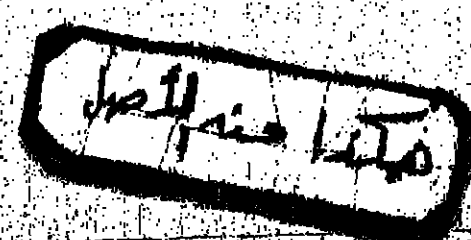
Telephone Barry Greenwood during normal office hours on Bournemouth (0202) 292373, extension 4444.

Outside normal working hours telephone Terry McDowell on Christchurch (02015) 77618 for details of the Shift Supervisor vacancy, and Barry Greenwood on Bournemouth (0202) 761983 for details of all other vacancies.

Write to Barry Greenwood at Systems Administration Department

Abbey Life

Assurance Company Limited
80 Holdenhurst Road, Bournemouth BH8 8AL



SHIFT LEADER

BRISTOL AVON DIVISION
BATH

Salary — £4600 to £5000 (inclusive)

We currently require a Shift Leader to supervise the activities of a team of operators covering operating and control functions on an IBM 370/138 under OS/VS1 with links to terminals in Poole, Bridgwater and Bristol.

This is a comparatively new installation and the opportunity exists for the successful applicant to play a significant part in the overall development of the Operations Section. Working conditions are attractive in well sited offices close to Bath city centre. Assistance with relocation expenses will be given when appropriate.

If you have at least 2 years' IBM experience in an OS/VS1 environment why not ring LEN SALTER or GRAHAM STEVENSON on Bath 313500. Alternatively ring or write for an application form to R. Shergold, Divisional Personnel Officer, P.O. Box 95, The Ambury, Bath BA1 2YP, Bath 313500.

Closing date: September 18th, 1978.

Wessex Water

BRIGHTON POLYTECHNIC COMPUTER CENTRE

The Computer Centre provides services for teaching, research and administration for the Polytechnic and a number of local colleges and schools based on ICL 1904A/Omega M16V and Hewlett Packard 2000 systems supporting batch, remote batch and multi access facilities. Planning for a major re-equipment programme in the early 1980's is about to begin.

The following vacancies have arisen from the expansion of the newly formed User Services Section

1. Senior Applications Programmer £4,101-£5,658
To support and develop applications primarily for the Faculty of Natural and Life Sciences
2. Applications Programmer £3,732-£5,073 inclusive of supplements.
To assist development primarily in the areas of Engineering and Environmental Studies. Exceptionally, appointment to this post may be made in the Trainee grade £2,823-£3,551.

Previous applicants need not re-apply.

Formal qualifications and/or experience of computer applications in the areas indicated are desirable, particularly for the senior post.

For further details and an application form, please contact the Personnel Officer, Brighton Polytechnic, Moulsecomb, Brighton BN2 4GJ. Tel Brighton 88385 Ext. 2537.

For informal enquiries, please contact Helen Davis or Brian Bailey on Ext. 2189/2188.

Closing date 29th September, 1978.

LEICESTER POLYTECHNIC SCHOOL OF MATHEMATICS, COMPUTING AND STATISTICS

LECTURER IN OPERATIONS RESEARCH (Post No. 307)

Required to teach Operations Research and some Statistics and/or Mathematics. Candidates should have an interest in areas such as business, commerce, manufacturing.

LECTURER II/SENIOR LECTURERS IN DATA PROCESSING

(Post Nos. 306 and 340)

Candidates should have experience in programming and systems analysis in a business environment. Knowledge of data base applications and/or microprocessors would be an advantage.

SALARY FOR POST 307:
£4,101-£5,658 p.a.

SALARY FOR POSTS 306 and 340:
£4,101-£7,085 (bar) £7,572 p.a.

Further details and application forms available from Staffing Officer, Leicester Polytechnic, P.O. Box 145, Leicester LE1 9QH. Tel. (0533) 50181, Extn. 2301/2302.

Next week
Yorkshire will
be at home
in Leeds.

We are Yorkshire Imperial Metals Limited and next Thursday we want to meet you in the centre of Leeds at Leeds Interviewing Centre, Suite 203, County House, 82, Vicar Lane. The week after we will be in Manchester and on the 28th September we will be in London. We'll be there any time between 10am and 8pm, so just come in and find why we have so much to offer.

We have recently changed our hardware to a 370/148 running under OS/VS1 and supporting CICS and DL/I and currently need the following people:

SYSTEMS ANALYSTS
With around 5/6 years experience and a detailed knowledge of hardware and software to investigate new techniques.

SENIOR PROGRAMMERS
With around 4/5 years experience and a thorough knowledge of programming to handle large and sophisticated programme suites.



**YORKSHIRE
IMPERIAL**

(Ink)

Applicants should preferably be graduates or have a relevant professional qualification.

We can offer salaries of around £5K-£6.5K, many benefits and exceptional prospects within the company, part of a major British Group.

Spare a few minutes next Thursday and call in. If you can't make it, please us on Leeds (0532) 701107, Ext. 424, or write to Senior Appointments Officer, Yorkshire Imperial Metals Limited, P.O. Box 166, Leeds, LS1 1RD.

Telephone, or write with cv to:

Group Staff Personnel Manager,
NEWMAN-TONKS LTD.,
Lower Tower Street, Birmingham B19 3NN
Tel: 021-359 5461

Newman-Tonks

ANALYST/PROGRAMMER

2903 BIRMINGHAM £NEG.

We are a medium sized manufacturing Company in the West Midlands producing a large range of products which are accepted leaders in their fields. Our current and future work load is mainly on new projects in the Administrative, Financial and Manufacturing areas.

The demands on our Management Services Department continue to grow and we now seek to appoint a wide-jawed all-rounder to take initiative and responsibility in a stimulating small team environment.

Our existing configuration consists of an ICL 2903 with EDS 60's and simple communications using 7502 terminals. Exciting enhancements to both Hardware and Software are envisaged, and you will have a real opportunity to consolidate your own experience whilst contributing to our Company's future development.

Ideally, but not essentially you will have an ICL background with RPG2 and/or Cobol coding experience. Previous involvement with Production Control applications would be an asset.

We offer an attractive salary package together with the usual benefits. Assistance with relocation will be considered where applicable.

Telephone, or write with cv to:

Group Staff Personnel Manager,
NEWMAN-TONKS LTD.,
Lower Tower Street, Birmingham B19 3NN
Tel: 021-359 5461

Senior Computer Operator

Develop with Courage

Courage, a division of the Imperial Group Limited is one of the largest brewing companies in the UK and encompasses breweries, distribution depots and public houses. Our Data Processing Centre is in a new building in Western Avenue close to Park Royal and North Acton tube stations. Our operation is based on two ICL 1903T computers currently running under George 2S using MAXIMOP. To operate on this configuration and to help implement our advanced systems we are currently looking for a Senior Operator. You will work on a three shift system. The duties are varied and so offer interesting work in a very pleasant environment. We also provide full internal and external training to allow you to develop your technical skills. The successful applicant will have at least 18 months experience on ICL 1900 series equipment.

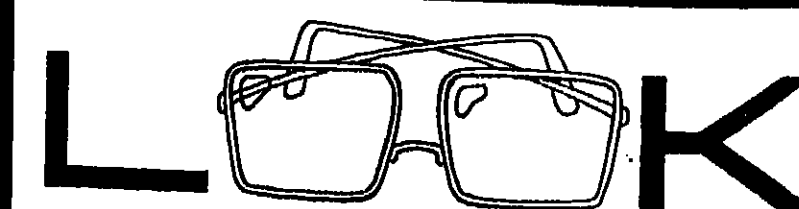
In return we offer an attractive starting salary and the additional benefits of car parking, pension and insurance arrangements, company products discount and subsidised restaurant.

If you would like to contribute towards our future development and success please contact

Barbara Wren,
Personnel Officer,
Courage Ltd.,
Data Processing Department,
Manfield House,
332 Western Avenue,
Acton W3. Tel: 01-992 5591.

COURAGE

MYRIAD



TO THE FUTURE

Our client, part of a large international organisation based in North London, and the leader in a specialised manufacturing field, is seeking to extend its Data Processing services throughout the company.

Recently a real-time order processing system has been implemented on the company's Univac 90/30 mainframe. Due to the success of this major project the Data Processing department has currently many enquiries regarding the computerisation of other commercial applications. Responding to this demand opportunities have arisen for the following career-conscious professionals.

SYSTEMS PROGRAMMER £6000-£6500

A minimum two years' Assembler programming and one year's systems software experience. The opportunity exists for the ideal candidate to design and recommend an extensive T.P. network throughout the organisation where previous experience would be a definite asset.

ANALYST/PROGRAMMER £5500-£6000

Candidates should have a sound ASSEMBLER background, ideally supported by a knowledge of COBOL, and be able to liaise with users and produce results with minimal supervision.

PROGRAMMER £5000-£5500

A minimum two years' commercial COBOL programming background incorporating a high level of self motivation gained in a Univac 90 Series or IBM 370 environment.

DATA CONTROLLER £4500-£5000

Previous experience in installing and maintaining control systems together with the ability to communicate effectively with all levels of staff and management.

Successful applicants will join an installation that enjoys a very flexible working environment and where many company benefits contribute to make this an excellent move in one's career progression.

Myriad Appointments Limited - Computer Personnel Consultants
30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

Senior Systems Analyst Systems Analyst Programmer

Wyeth Laboratories have modern offices situated in attractive grounds at Taplow, Maidenhead, Berkshire and a Pharmaceutical Production Unit at Havant, Hampshire.

The Data Processing Department at Taplow is to provide a teleprocessing service to the Havant location in 1979 and the above appointments are to be made to develop and implement production control and accounting systems.

All applicants should have some programming experience and a knowledge of IBM DOS. The Programmer must be able to demonstrate a working knowledge of PL/I.

Applicants for the Senior Systems Analyst and Systems Analyst positions must have had at least three years commercial systems experience and applicants with teleprocessing experience will be preferred.

Please apply giving details of age, experience, and present salary to:- Mrs. J. Andrews, Personnel Officer Wyeth Laboratories, Huntercombe Lane South, Taplow, Maidenhead, Berks.

Wyeth Laboratories

data scene

CONTRACTS FOR

PROGRAMMERS & ANALYSTS

THROUGHOUT
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URGENT REQUIREMENTS THIS WEEK
INCLUDE:

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BASIC+, RSTS/E,
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TOP RATES

IMMEDIATE STARTS

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BOB EDWARDS
TODAY

Data scene Recruitment Limited
Sceptre House
169-173 Regent Street
London W1R 7FB
01-439 1856
24 hour answer phone

Thames Polytechnic

Computer Centre Computer Operator

Applications are invited for the post of Computer Operator from persons with at least five GCE "O" level passes, or equivalent. Some knowledge of computer operations would be an advantage but training will be given to a suitable person. Commencing salary up to £4042 per annum, inclusive.

Details and application form (to be returned by 18th September, 1978) from the Staffing Officer, Thames Polytechnic, Wellington House, London SE18 6PP (01-854 2200 ext. 433).

UNIVERSITY OF GLASGOW COMPUTING SERVICE

Administrative Data Processing Group PROGRAMMER

Applications are invited from suitably qualified persons for the post of Programmer within the Administrative Data Processing Group of the University of Glasgow. Applicants should be in the possession of a University degree or equivalent. Preference will be given to those with at least 2 years' experience of programming or working in a data processing environment. Salary will be in the range from £1654 to £2655 per annum (currently under review) with initial placement according to age, qualifications and experience.

Applications should be lodged by 22nd September with the Secretary of the University of Glasgow, Glasgow G12 8QQ from which further particulars may be obtained. In reply please quote Reference No. 4238P.

PROGRAMMERS

up to £6,800 pa



S&C
make the
going
safer

WE PRODUCE systems using minicomputers and microprocessors to enable Railway Signal control of trains through some of the busiest junctions in the world.

THIS NEEDS co-operation between programmers and engineers from the laboratory through the factory and into the signal box.

WE WANT Programmers at all seniority levels to work on developments and projects. An engineering background is valuable but not essential.

YOU WILL have the satisfaction of seeing a job through from initial design to working on site.

CONTACT Mr. C.A. Porter, GEC General Signal Limited, Elstree Way, Borehamwood, Herts. Telephone 01-953 8211 extn. 3521, or complete the FREEPOST coupon.

FREEPOST - no postage necessary - just fill in and post to GEC General Signal Limited, FREEPOST, Borehamwood, Herts. WD6 1BR.

I have experience over		2 years		3-5 years		6-10 years		11-15 years		16-20 years		21 years or more	
My present salary is in the range		£4000-4500		£4500-5000		£5000-5500		£5500-6000		£6000-6500		£6500 or more	
Please tick all that apply													
Name _____													
Address _____													
In Domestic Telephone No. _____													
In Business Telephone No. _____													
Fax No. _____													

DATA PROCESSING MANAGER

Our clients are a major international Arab financial institution, based in Riyadh, Saudi Arabia.

They are taking delivery of a brand new ICL 2903/40 in January 1979, and are currently looking for a Data Processing Manager to become involved in the finalised preparation for the installation of the new machine, and the subsequent running of the installation.

We are looking for the following qualities from applicants:

- ★ Strong technical background, preferably with knowledge of on-line techniques.
- ★ Experience of ICL 1900 or preferably, 2903 hardware.
- ★ Proven managerial skills.
- ★ Preferably a Financial/Investment-based background, although by no means essential.
- ★ Preferably aged 28-35, and married.

The benefits include an extremely generous tax-free salary, plus a 6% annual increment; free furnished family accommodation to include utilities and to be based in a compound with swimming pool and tennis courts; medical expenses; private education subsidy; a minimum of two return air-fares for the family to the U.K. every year, and generous additional holidays in Saudi Arabia.

The contract is for two years, on a renewable basis. Interested applicants should ring D.P. Recruitment Ltd. immediately, quoting ref. DW 927. AS ALL INTERVIEWS WILL BE HELD DURING THE WEEK SEPTEMBER 11-15, 1978.

D.P. RECRUITMENT LTD.,

KENT HOUSE, 87 REGENT STREET, LONDON W1R 7HE

TEL: 01-437 2062 3 4 (24-HOUR ANSWERPHONE)

SIEMENS

Computer Programmers Program your future into a growth company

Siemens Limited is a successful and expanding UK company, part of one of the largest worldwide electrical and electronics engineering organisations.

We now have an exciting opportunity for men and women with 18 months' plus experience to develop, test and maintain computer programmes in a commercial environment. You will be based at our Sunbury Head Office with occasional travel to our branches.

As part of a small, young, DP team and working closely with a Systems Analyst, you will have the opportunity to work on a number of applications which will enable you to develop your full potential. Longer-term prospects could be in systems analysis.

Working conditions are excellent and, in addition to a negotiable salary, benefits include non-contributory pension scheme, 20 days' holiday entitlement, subsidised restaurant and sports and social club.

Contact Phil Bainbridge, Personnel Department, Siemens Limited, Windmill Road, Sunbury-on-Thames, Middlesex. Tel: Sunbury 85691 ext 325/322.

If you are an Analyst or a Programmer and know your business, American Express would like to meet you either in Brighton, London or Croydon

We have told you before that American Express are growing. Computing is a vital part of that growth. Their European Headquarters are in Brighton, where they operate a 370/158 with OS/VSI using CIC/VS and VSAM. The two main programming languages are Assembler and COBOL. They are also currently installing Burrough's B.1800's in Frankfurt and Paris and more installations are planned in other parts of Europe. They also have links to Frankfurt, Paris, Rome, Amsterdam, Brussels, Zurich and Madrid.

They wish to meet a number of Analysts and Programmers who would like to join them in their expansion. As one of the largest IBM users world-wide, they are very anxious to meet anyone with a strong IBM background. As important is a Burrough's background, both in systems and in programming. The opportunities available internationally in this second area are significant.

To enable you to meet American Express at a time that is convenient they have arranged to be at the following places at the following times:

CROYDON

Date: 12th Sept. '78
Time: 3.00-8.00pm
The Park Lane Suites,
The Greyhound
Park Lane,
Croydon

LONDON

Date: 13th Sept. '78
Time: 3.00-8.00pm
Royal Westminster Hotel,
49-57 Buckingham Palace
Road,
London SW1

BRIGHTON

Date: 14th Sept. '78
Time: 1.00-8.00pm
American Express Company
Amex House,
Edward Street,
Brighton.

Incomes are good, there is a comprehensive relocation package, and the career opportunity both in geographic and technical terms is first class. If, however, you cannot attend at the times mentioned, please contact us either by phoning John Goldsmith or by filling in the application form on the opposite page.

One other point, if you have experience in any other area of computing or in management services generally, and would like to work for a dynamic, growing company, then American Express may well have openings that would be attractive. We would like to meet you as well. Ref. 1893/CW.



Computing
Services
Association

WE ARE ALWAYS INTERESTED IN HELPING YOU WITH YOUR CAREER
Goldsmith Recruitment International Ltd., 15 Buckingham Palace Road, London S.W.1.
Tel: 01-828 5356 - 24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.

TORONTO—CANADA Computer Specialists and Clerical Systems Specialists

Our client is Bell Canada, one of the largest and most successful companies in Canada. They now wish to recruit the following staff for their Corporate Systems Division. In all cases, incomes are extremely attractive and relocation expenses are paid.

Systems Analysts

Applicants should possess extensive experience of project design and implementation on medium or large scale applications. They will need a sound knowledge of IBM hardware/software and knowledge of data base techniques would be

particularly attractive.

There are also openings for SENIOR ANALYSTS with sound experience of on-line system design, based on IBM operating systems. Ref. 1887.

Data Base Software Specialists

The requirement is for personnel capable of optimising the software supporting a large, multiple user IMS/VS DB/DC system, including 3MPs. Knowledge of DB/DC performance and resource consumption analysis packages is

desirable. At least 2 years' experience with IMS (preferably IMS/VS) is essential. In addition, experience with VSAM and/or TCAM, VTAM would be an asset. Ref. 1888.

O & M Analysts

Candidates should have experience in O & M work across the whole range of business activities, including accounting, production planning and control, purchasing, marketing and inventory control. They should be experienced in work

measurement, used to project management, be capable of presenting and selling proposals, and conducting projects through implementation to user satisfaction. Ref. 1889.

Data Base Design Specialists

Candidates must have strong analytical skills and experience in data base management systems, preferably IMS. A good knowledge of IMS DB/DC,

IMS design aids and performance measurement is highly desirable. Ref. 1890.

Hardware Systems Specialists

Candidates should have a minimum of 3 years' experience in a large scale, IBM hardware and software planning environment. An in-depth knowledge of IBM hardware and plug-compatible

peripheral equipment is required, as well as a good understanding of large scale operating systems. Ref. 1891.

Data Communication Specialists

A minimum of 3 years' in-depth experience with small scale systems (such as PDP11), used as front-ends to large systems, plus a good understanding of communications protocol and

access methods, together with a working knowledge of control program software is also required. Ref. 1892.

Representatives from Bell Canada will be in the United Kingdom during October. We would therefore like to receive applications as quickly as possible. Please apply to John Goldsmith, quoting the appropriate reference number, by either sending a curriculum vitae or asking for an application form.



Computing
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WE ARE ALWAYS INTERESTED IN HELPING YOU WITH YOUR CAREER
Goldsmith Recruitment International Ltd., 15 Buckingham Palace Road, London S.W.1.
Tel: 01-828 5356 - 24 hour answerphone service.

JOHN GOLDSMITH (Computer Recruitment) Ltd.

SYSTEMS ANALYST

DUBLIN - £6-7000

THE COMPANY one of Ireland's long-established and most progressive manufacturing industries based on the outskirts of South Dublin.

THE D.P. DEPT. is a small and friendly unit having recently upgraded its hardware to an ICL 2904 utilising JCL and plans to install T.P. in the early part of next year.

THE APPOINTMENT requires an Analyst who is competent in all aspects of analysis as well as being able to supervise a small team and deputise for the Data Processing Manager in his absence. This is an excellent opportunity to join the team at an extremely interesting stage of development, allowing the selected candidate to broaden and contribute his or her skills within a rapidly changing environment. For further details please quote C.W.206.

EDMUND HOWARD & PARTNERS

5 BRIGHTON ROAD, SURBITON, SURREY
TEL: 01-399 9183
38 GRAFTON STREET, DUBLIN, IRELAND
TEL: 77-57-56

Computer hardware support engineer

Kodak Limited, world leaders in the production of photographic materials and equipment, have a vacancy for a Computer Hardware Support Engineer in the Engineering Division at the Harrow Plant.

The job involves working within a small team providing a hardware support service for process orientated on-line real time mini/micro computer systems.

The successful candidate, male or female, will be educated to a minimum of H.N.C. or equivalent in a relevant discipline and will preferably have a minimum of one year's practical experience in installation and commissioning and/or maintenance of Argus 500 or PDP computer systems.

The position offers a unique opportunity to become involved with mini/micro computer technology as applied to photographic film and paper manufacture.

Kodak Limited offers excellent working conditions and employee benefits.

Salary up to £7,500 per annum will be negotiable and dependent on qualifications and experience.

Please write or telephone for application form, quoting reference 58/114, to:

Mr. R. Tomlin
Personnel Department
KODAK LIMITED
Kodestone Drive
Harrow
Middlesex
Tel: 01-427 4380, Ext. 606



MYRIAD

PROGRAMMERS SOUTHERN ENGLAND

To £5000

Join a Company offering you a real career opportunity.

If you have just completed your first 18 months or so as a COBOL programmer then you are most probably looking to the future. Certainly on deciding on your next position several points will be uppermost in your mind.

Are you looking for a technical role, moving towards database design, on-line real-time file structure analysis and optimisation of system usage, or a move towards heavy user involvement in establishing requirements as a preliminary to systems analysis and design, going on to a Project Management role, leading a team in developing major systems?

Are you looking for a well established, medium sized company with a market leader product and a steady record of growth; perhaps a highly independent company, a member of a larger Group, offering the long term career path to more senior roles in the future?

Location is also of prime importance, since this is frequently the time when flat/house purchase is on your mind, or schooling for the family is becoming increasingly important. Ideally you may like to be within a short journey of London, in a residential, attractive part of England, and if the Company gives you five weeks' holiday, relocation expenses and pays any overtime that may occur then all the better.

Certainly our client offers these attractions, for programmers who are keen to move either towards analysis or to more technical involvement. Working with on-line real-time applications on an IBM mainframe will move your career into the mainstream of commercial data processing.

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants
Telephone or write to:- 30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

D.P. Staff

Saudi Arabia £13-£16,000 tax free
Riyadh + free accommodation

An established and rapidly growing Systems Management Company seeks experienced staff for initial two year contracts.

User Instructor

to train personnel in uses of a computerised information system
Data Preparation Section Leader
to supervise preparation, document processing classification and coding.

Key punch Supervisor
to supervise data entry activities

Key punch Instructor

to train personnel in keypunching and verification.
Contracts are negotiable on a two year basis with free housing and free education for children. A round trip to the country of residence for a six week vacation per year is paid by the company. Passages for staff and their families is free. Male candidates capable of spoken and written English and Arabic should send full details and telephone numbers in confidence quoting reference T883/CW to



R. J. Mooney,
Arthur Young Management Services
Rolls House, 7 Rolls Buildings
Fetter Lane, London EC4A 1NL

HOUSES OF PARLIAMENT

COMPUTER DEVELOPMENT OFFICER

This is an important new post which requires a person with wide ADP experience and considerable ability.
The Computer Development Officer will act as an adviser on computing matters to both Houses, and will plan and implement all computer developments in Parliament.

A comprehensive feasibility study is required as a first step. The Computer Development Officer will undertake this in association with consultants.

It is expected that the Computer Development Officer will manage and develop suitable computing services but a significant "in House" computer resource is not likely to be required.

The work will be closely concerned with the development of existing and new services, including information systems, to satisfy the requirements of Members and Officials of both Houses of Parliament.

The successful candidate will have had good management experience and should be able to communicate effectively on both technical and non-technical matters with Members, Senior Officials, Government Departments and the Computer industry.

This is a senior post, in the House of Commons, and the salary will be commensurate with experience. The salary, however, is likely to be between £10,000 and £12,000.

The appointment will commence as soon as possible after 1st December, 1978 and will be for a period of four years in the first instance. There is a non-contributory pension scheme with interchange arrangements with other Public Service pension schemes.

Write for further details and application form to: Establishments Section, House of Commons, London SW1A 0AA. Closing date for applications: 2nd October, 1978.

NORTHERN RECRUITMENT FEATURE

Advertisers are reminded that the next Computer Weekly area feature will be published on September 28 and will highlight career opportunities in the North.

Space reservations should be made as soon as possible to:

Owen Kelly — Manchester — 061-872 421
Eddie Farrell — London — 01-261 8097

Copy Deadline: PM Friday before.

COMPUTER WEEKLY

THE INDUSTRY'S WIDEST READ AND MOST REQUESTED NEWSPAPER

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SPECIALISTS IN DP AND EXECUTIVE RECRUITMENT

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PROJECT LEADERS SYSTEMS ANALYSTS

SOFTWARE DESIGNERS PROGRAMMERS

£8,000-£12,000 p.a.

We are acting for a large U.K. Organisation with considerable activity throughout Europe, who are enjoying an unprecedented rate of growth owing to the demands being placed upon them for utilising their expertise in satisfying major clients' needs.

If you feel you can match the following requirements and are ready to accept a very lucrative opportunity with the relevant rewards in terms of earnings and experience, and would enjoy working in a very attractive part of Europe, then one of these opportunities could be for you.

PROJECT LEADERS/SYSTEMS ANALYSIS

1. We are looking for quality personnel currently working in the role of Systems Analyst/Project Leader preferably with experience in designing systems for Honeywell 66 and Model 6 hardware.
2. Your systems experience is likely to include Banking, Government and Commercial type applications.
3. Ideally you will have been associated with Systems Design incorporating communications and/or Message Switching facilities.

SOFTWARE DESIGNERS (Word Processing)

1. Candidates currently engaged in designing Software for Word Processing equipment are likely to fit this requirement.
2. You will be called upon to work on the development of Software for a brand new series of Word Processing hardware.
3. You will be based near the Italian/French border and will initially work on an assignment which is expected to last upwards of one year's duration.
4. Ideally you will be single although married applicants will not be precluded from consideration.

PROGRAMMERS

1. We are specifically seeking programming personnel with BASIC, NCR, NEAT and HONEYWELL ASSEMBLER/COBOL experience.
2. You will be working on Batch and Real Time Systems based upon DEC, HONEYWELL and NCR hardware.

IF YOU CONSIDER THAT YOU DO NOT MATCH THE ABOVE PARAMETERS, BUT ARE CURRENTLY WORKING WITHIN A DATA PROCESSING ENVIRONMENT AND CAN CONVERSE FLUENTLY IN ITALIAN, WE WOULD STILL LIKE TO HEAR FROM YOU.

TELEPHONE US NOW OR WRITE SENDING US A COPY OF YOUR C.V., WHEN WE WILL ACT IMMEDIATELY IN ARRANGING AN INTERVIEW IN LONDON OR THE SOUTH.

DO YOU WISH TO WORK ON MOST EXCITING SOFTWARE AND OBTAIN MAXIMUM JOB INTEREST?

SENIOR SYSTEMS ANALYST/PROGRAMMER

SALARY UP TO £7,500 CIRCA PER ANNUM
+ generous relocation expenses where applicable
According to experience

Our client produces highly sophisticated electronic systems each of which needs individual specialised computer systems and software. However, it is more than possible to transfer from a commercial field where you have a background in say, Stock Control, Payroll, Financial Systems. The transition from commercial systems to a technologically based environment is an opportunity that will provide you with greatly increased job interest and a personal involvement with Real Time, On-line systems.

We are looking for a person who has come up through programming and can demonstrate good systems implementation with a minimum of five years' experience.

Systems experience should preferably have been on-line biased and the person should be able to demonstrate their direct involvement with the software.

This is a real opportunity and will provide a rewarding and structured career which will give security and opportunity.

PLEASE TELEPHONE US IMMEDIATELY FOR FURTHER DETAILS OR FORWARD YOUR PREPARED C.V. TO:

Thorbar

Abraxas Recruitment Division

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J/GEN
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to £4,300
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to £4,300
to £5,000

ICL 1800/2800 —

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Ascii through the Logic Gate

An epic in 32k words, by Richard Forsyth
Block 14 (Blocked Up)

While Simula is left to the tender mercies of Inspector Extracode, Cleo is alone with Ascii confronting the wild apeman in the hills. Hex, Lambda and Zap being out cold on the floor of their refuge.

The beast's enormous fur-covered pot-belly filled the doorway. Cleo covered back against the wall.

"Mi ne volas dolorigi vin," it bellowed.

"What's it saying?" she asked Ascii in the hope that a blonic dog might understand a talking ape; but Ascii, who lacked the gift of tongues but understood body language very well, had interpreted a body of such size as meaning danger and scampered further up the tunnel. The creature stooped down and poked its head into the cave. For the first time she got a close-up view of its face. Its ears were very tiny and lay flush against the side of its head. Apart from a slightly protruberant jaw, containing some very big teeth, and a nose that was more like two holes above the mouth than a proper nose, its face had a distinctly human aspect. The tufted red hair that covered its head and chin did not extend across the cheeks or forehead, and its eyes looked too knowing for a mere brute.

She could have sworn it was attempting to smile. Bemused, she shrank further back. She was relieved to see that it was indeed too vast to squeeze inside; but her relief turned to horror when she realised that her three friends were within range of its long arms. She watched aghast as its hand moved out and prodded the 'Off' switch on the black box.

Lambda was the first to react. She yawned and rubbed her eyes as if waking from a long dream, then pulled out the lead that connected her to the computer. When she opened her eyes and saw the creature she displayed little concern.

The apeman, who had made no attempt to molest her, though she was within reach, spoke again: "Ne sentu, timon; mi manghas nur vegetalojn."

"How about that?" exclaimed Lambda, "a talking ape!"

"That's what he said before," said Cleo. "What does it mean?"

"He says: 'Have no fear, I am a vegetarian.' It's Esperanto. I studied it at school."

By now Hex and Zap were stirring.



"Wake up boys," said Lambda enthusiastically, "we've got company."

Hex and Zap stared at the animal, now squatting on its haunches.

"It's a Sasquatch!" cried Zap. "I thought they were extinct."

"That's not half of it," said Lambda. "It can talk too."

"Via amiko mi estas," intoned their visitor solemnly.

"I thought you said it spoke English," complained Hex.

"Not English," replied Lambda. "That's Esperanto for 'I am your friend.'"

"Well, tell King Kong we want to be his friends too," said Hex, appreciating its size and proximity.

"Ni ankau deziras esti viaj amikoj," said Lambda hesitantly; then she apologised to her friends: "I'm afraid I'm a bit rusty."

But it had understood. It clapped its hands in comprehension and was soon merrily prattling away to Lambda, happy to have found a fellow Esperantist to confide in. The

others listened in silence. Even Ascii crept closer again, curiously getting the better of fear. Whenever it paused to draw breath, Lambda turned to them and relayed the gist of what she had caught, then said a few halting words back to carry on their peculiar conversation.

It transpired that Zap had been right. It was a Sasquatch, or Pladego. But he had also been right in thinking that Sasquatches were extinct. The story that unfolded as Lambda related its utterances was an extraordinary one.

Pitdown, as he called himself, was a laboratory animal — in the strictest sense of that term. Far from being the wild creature they had taken him for, he was a manufactured artefact. He was one of a number of experimental prototypes built by a secret team of specialists working in a subterranean cavern deep within the bowels of the Sierra Nueva, unknown to all but a few high-ranking System officials. This team, the Advanced Systems Group, had one overriding objective — to design the successor not just for mankind (which was already obsolete) but for the robots and androids man had created in his own image, in short, for the System as a whole.

They learned that Pitdown himself was a sideline, a diversion constructed for entertainment by one of the more brilliant scientists, but that because of his great strength he, unlike his fellow inmates in the menagerie, had been able to break free during a field trial of his dietary habits on the surface. As far as Pitdown was aware the Future System would not depend on individual agents such as robots or androids, still less on home-made Sasquatches. Nevertheless, to perfect the fundamental genetic technology necessary for its production, experiments with fabricated beings such as himself went ahead.

He finished by pointing out that he was sure that a hue and cry had been raised when he escaped and that a search party might soon follow. Immediately Lambda was assailed by a barrage of questions which the others wanted to put to him. This quite overwhelmed her mastery of the language and left her dumb for a moment.

While they waited for her to translate, Ascii, ever alert, gave a plaintive whine. His sensitive ears had detected movement at the top of the entrance tunnel. He bolted out into the crater once more. Hex realised what was going on. The zookeepers had come to reclaim Pitdown.

"Everybody out!" he shouted, grabbing the precious black box as he ducked out into the open air. Cleo, Lambda and Zap followed rapidly. Without wasting any time, Pitdown, who had jumped to the same conclusion, ran down to the dead tree-trunk by the water. He wrapped his huge arms round it and uprooted it with one mighty heave, then, grunting, he dragged it to the cave, where he let out a terrifying roar before plugging their exit once and for all.

They were safe for the moment, but, looking up at the cliffs that enclosed them, Cleo couldn't prevent herself asking, "How are we ever going to get out?"

How indeed? There must be some way out of here.

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The Polytechnic of North London

Northern Regional Health Authority

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If you would like further details about the post, telephone Mr. Spence on 0422-57122, Ext. 270. Written applications should be sent, together with the names and addresses of two professional referees, to the Personnel Officer, Town Hall, Halifax, by Friday, 18th September, 1978.

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LEE RICHFIELD LIMITED
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Application forms and further particulars available from Regional Personnel Office, Haverhill House, The Strand, Liverpool L2 7RW. Please quote Ref: 4/84.

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